IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

LG DISPLAY CO., LTD,) Volume 3
)
Plaintiff,)
)
v.)
)
AU OPTRONICS CORPORATION,)
AU OPTRONICS CORPORATION)
AMERICA, CHI MEI)
OPTOELECTRONICS)
CORPORATION, and CHI MEI)
OPTOELECTRONICS, USA,)
INC.,)
)
Defendants.)

Thursday, June 4, 2009
9:00 a.m.
Courtroom 4B

844 King Street
Wilmington, Delaware

BEFORE: THE HONORABLE JOSEPH J. FARNAN, JR.
United States District Court Judge

APPEARANCES:

BAYARD
BY: RICHARD D. KIRK, ESQ.
BY: STEPHEN B. BRAUERMAN, ESQ.

-and-

McKENNA, LONG & ALDRIDGE, LLP
BY: GASPARE J. BONO, ESQ.
BY: CASS W. CHRISTENSON, ESQ.
BY: LORA BRZEZYNSKI, ESQ.
BY: TYLER GOODWYN, ESQ.

Counsel for the Plaintiff

APPEARANCES CONTINUED:

YOUNG, CONAWAY, STARGATT & TAYLOR, LLP
BY: KAREN L. PASCALE, ESQ.
BY: JOHN SHAW, ESQ.

-and-

WILSON, SONSINI, GOODRICH & ROSATI
BY: RON E. SHULMAN, ESQ. ESQ.
BY: JULIE HOLLOWAY, ESQ.
BY: CRAIG TYLER, ESQ.
BY: GREGORY WALLACE, ESQ.

Counsel for the Defendants

THE CLERK: All rise

THE COURT: Be seated, please. Good morning.

Ready to proceed?

MR. BONO: Your Honor, just one housekeeping matter. With respect to yesterday's testimony, I would also ask that the portion of the deposition designation transcript relating to Mr. Kim's testimony relating to the Seico license be sealed as part of the trial transcript.

I think yesterday I only mentioned Hitachi and CPT. And I would also like that sealed. Plus, all the exhibits that relate to those agreements in that testimony.

THE COURT: Mr. Tyler, any objection?

MR. TYLER: No objection, Your Honor.

THE COURT: It will be done without objection.

MR. TYLER: May I proceed, Your Honor?

THE COURT: Yes.

BY MR. TYLER:

Q. Welcome back, Dr. Putnam.

A. Good morning.

Q. So, in your experience, do you believe that this is a complex damages case?

A. Yeah. I would say that of all the damages case I've worked on, this is probably the most complex.

Q. Why do you say that?

A. Well, in a typical case, you have one or maybe a couple of patents asserted by one party against the other. But in this case, you have a relatively large number of patents asserted by two competitors against each other.

Q. Is there anything about the type or amount of data that's different in this case?

A. Well, in this case, we have unusually good data on the cross-licensing behavior of the parties, in situations like I described where you have two parties that have claims against each other.

Q. Okay. The amount of data, does that make -- and type of data does, that make

your job harder or easier in this case?

A. Well, it makes your job harder initially because cross licenses are inherently complicated than one-way licenses. On the other hand, if you use more sophisticated methods, you extract very precise estimates of the damages that we're trying to get to in this case.

Q. Okay. And we can go to the slides now, and I'd like for you, if you could sort of summarize what our complex problem is here.

A. Yes. The problem that we're trying to get to at the end of the day is how to value the four patents that AUO has asserted in this case. But these four patents aren't just sitting in space or in a vacuum. They're actually located in a particular context of industry and a pair of firms they're negotiating over.

Q. So in solving this problem, what approach did you use?

A. Well, I adopted four principles, I think, that guided my investigation.

Q. What's the first principle?

A. Well, the first principle is you

want to - to predict the -- how the parties are going to behave in a hypothetical negotiation with each other. Then the best indicator of how they will behave is how they behaved in the past.

So the past conduct of the parties, in particular in their cross-licensing negotiations with other competitors in the industry is going to be your best predictor of how they would behave in a cross-license with each other.

So the graphic shows the -- some of the cross-licenses that each of the parties has entered into with other LCD competitors.

Q. Okay. What's your other principle here?

A. The second principle is that you want to analyze all the data. So what I've done is modified the graph to show that each of the parties brings to the table, not only the past cross-licensing behavior, but also the entire patent portfolio.

So you see each party sort of papered over with hundreds or thousands of

patents that are part of the entire portfolio. You want to take those patents into account in determining the portion of the total value that is attributable to the four patents that have been asserted.

Q. And do you have a third principle?

A. Well, in the third principle, again, I've illustrated this in the graphic. The parties have cross claims against one another.

So each party is sitting across the table making a claim against the other party. And so you have a symmetric bargaining situation, which is unusual.

And what you want to do is develop a method that takes account of that symmetric bargain situation and treats each party evenhandedly without bias. So that the method that you apply in determining the value of one party's asserted patents and exactly the same method, you would apply to the other party in determining the value of their asserted patents.

Q. And does this mean you're going to have the same damages number for both sides?

A. No, of course not. The method is going to be the same, but since the data for each side are going to be different, you're going to end up with different numbers, because they're asserting different patents and accusing different sales.

Q. And what is -- you said the four, what's the fourth principle?

A. The first principle is that each one of the four patents is a part of the whole, so what this means in this case is that the parties typically transact over a whole, meaning an entire patent portfolio and what you want to do is look at the contribution to that whole of the four asserted patents that each side has actually brought to trial.

It's sort of like with a pizza, you got a whole pizza and you want to figure out the value of the slices of the pizza, so in this case the price of the whole pizza acts as a ceiling on the price of the individual slices.

Q. Okay. So in this case, why do you think one should consider all the cross licenses and patent portfolios for solving the damages

problem?

A. Well, remember the objective of the exercise of what we're trying to do here is to simulate the outcome of a hypothetical negotiation between the parties. The way the parties have actually behaved in the past is that they negotiate licenses with other members of the industry over their entire patent portfolios. So if you want to figure out how they're going to negotiate with each other in a hypothetical negotiation, then based on the first principle you should look at the way they've actually negotiated with each other in their past licensing -- not with each other, but with other similar firms with past licensing conduct.

Q. Could you give us an overview of the method you're going to use to solve the problem given these principles?

A. Sure.

The basic approach is going to be what I have called an industry price method of asserting -- of valuing individual patents. And what this means is that we're going to first of

all figure out the average price at which firms transact their entire patent portfolios, and then break that down so that we can figure out the particular price that should be charged for the individual asserted patents.

Q. And can you explain the steps of your method?

A. Yes. It's basically a three-step process and I think the next slide shows this. The first step is that we want to recognize the data that we observe is a cross license balancing payment. And so in each of the cross licenses that we find in the industry, one of the parties makes a payment to the other party. Now, it's represented on the screen by a green circle. But a green circle is -- green is not a primary color, it's really a mixture of two primary colors, yellow and blue.

So what I have shown is in a balancing payment that's really the net of claims that each party has made against the other, so firm A makes a claim against firm B, that's the yellow circle, firm B makes a claim against the firm A, that's the blue circle, and

when you mix the circles together you get the balancing payment or the net payment that the weaker party pays to the stronger party.

Q. The industry data that you mentioned are -- what data do you have that you're going to look at?

A. So for each of the agreements in the industry we have the green circle, which is the amount that in that transaction one party paid to the other, so we have a total of eight cross license transactions and they involve all of the major competitors in the industry. LG has a license with NEC, AUO has a license with Sharp and so forth. And so we're going to take all those -- we're going to use the balancing payments that we observe in these agreements to make a prediction and I think this next slide actually shows that.

Q. How are you going to make this prediction?

A. Well, the prediction -- just to be clear, the prediction we want to make is the balancing payment in the hypothetical negotiation between AUO and LG. What we're go

to do is use a statistical technique called regression analysis which is going to summarize all of the data and determine the rate at which given the particular characteristics of these parties they would exchange their -- the terms on which they would exchange their portfolios and what the size of their balancing payment would be.

Q. Is there another way you could have done this instead of using the regression?

A. I could have taken one of the cross license agreements at random and sort of eyeballed it and said well, I think this particular agreement is the most comparable and so that's why I think it should be imputed to the parties in a hypothetical negotiation, but that -- I was going to say that that's -- you know, as an economist what I'm trying to do is to summarize all the data and determine, you know, sort of the behavior of the parties in all of their agreements and not favor one agreement over the other.

Q. So what are you going to do with this prediction?

A. Well, that's the first step of the process. So I think the next slide shows that we're going to assume that we have got that prediction for the balancing payment that would exist between the parties so we have the green circle for AUO and LG.

Q. This would be a hypothetical negotiation over hundreds or thousands of patents?

A. Yes, exactly. That's the exchange of the entire worldwide rights to both parties' patent portfolios.

Q. Okay.

A. And then what we want to do is decompose that, we want to sort of extract from that process. We know that the green circle is really the combination of a yellow circle and a blue circle, the yellow circle being AUO's claim against LG, the blue being LG's claim against AUO.

And for the purposes of this part of the trial we want to focus on the yellow circle, which is AUO's claim against LG.

Q. This is the second step?

A. Yes. And again, the regression analysis, because of the way I have formulated the model, the regression analysis is actually going to allow you decompress the predicted balancing payment into the two constituent parts.

Q. What's your third step?

A. The third step now that we have AUO's aggregate claim against LG for the hundreds or thousands of patents that it's asserting, what we want to do is narrow that down to the contribution of that, to that claim of the four patents that it's actually asserted in this trial. And we're going to use a method that I call count, rank and divide to try to figure out how to distribute that pie so that each patent gets its appropriate share.

Q. I'm going to jump right in and see how you use this method to solve the problem here. Where do you begin, what's the first step?

A. Well, the parties have already agreed that this is not a lost profits case, so we start with using a reasonable royalty.

Q. And how do you calculate a reasonable royalty?

A. A reasonable royalty is what emerges from a negotiation between a willing licensor and a willing licensee.

Q. And what do you mean by that, willing licensor, willing licensee?

A. A willing licensor is somebody who knows that they have to license their patent, and a willing licensee is somebody who knows that the patent is valid and infringed and recognizes that they have to buy the rights to the patent, and so then the only question is what's the price at which the rights to the patent or patents in this case are exchanged.

Q. And should that allow the willing licensor and willing licensee to make a profit in your understanding?

A. Yes, each side should be able to make a profit as a result of that exchange.

Q. Does the law, based on your understanding, provide a framework for how you would construct, find what the willing licensee and willing licensor would pay?

A. Yes. The standard framework that's used for reasonable royalty is called the Georgia-Pacific factors.

Q. Did you consider those in this case?

A. Yes, I did.

Q. Let's walk through how you did your analysis on the Georgia-Pacific factors. If we go to the next slide.

A. Sure.

Q. Can you explain what this shows?

A. Yes. Well, there are fifteen Georgia-Pacific factors. And the way they're listed in this case is actually in kind of a semi-random order, so I find it convenient to regroup the factors so that you consider similar factors all at the same time with related data. So I have listed them here.

The first is the actual licensing conduct of the parties. Secondly, information on the profits. Third, the commercial advantages of the technology. And finally, the parties' commercial relationship and their bargaining position.

Q. Do all fifteen of the Georgia-Pacific factors fall within your four groupings?

A. Yes, that's right.

Q. Do you view in this case any one of these groupings as more important than the others?

A. In this case given the data and the conduct of the parties, I would say that the first group is the most important. Again, what we're trying to do is simulate the outcome of a hypothetical negotiation. And what we have good information on is how each of these parties has negotiated with other competitors in the past.

So in the first factor, for example, which is the rates, or the first two factors, the rates paid and received by the parties, the court, or the law looks in particularly to whether there is an established royalty and when looking at an established royalty it determines something for consistency of behavior. Here we're looking again for consistency of behavior.

Q. When you said established royalty,

do you believe that there is an established royalty in this case?

A. No, because an established royalty typically refers to the rate that is charged for a particular patent. The parties don't license any of the asserted patents on an individual basis so there is no license you can point to which says here is the price of the individual patent. But what the law does look for is consistency, as I said. And so what you're looking for is consistency of behavior. And in this case, they consistently license their portfolios at a very predictable rate

Q. Why do you care about consistency of behavior from the past licensing?

A. Well, if you go back to our first principle, the best way to figure out what the party will do in a hypothetical situation is to look at what they have done in similar past situations. And so, if you can -- if you are -- if you can understand -- if their past behavior is consistent, then you are more likely to be able to predict what they've done, what they will do in the hypothetical situation.

Q. Okay. So the consistency of behavior will set the stage for the hypothetical negotiation?

A. Yes, that's exactly right.

Q. What evidence did you consider in this case regarding the parties' past licensing conduct?

A. Well, we looked at -- there's a very large number of licenses that were produced. I and my team went to look at more than 70 industry licenses, both within the industry between the LCD competitors and also between an LCD competitor, and somebody outside the industry.

And we focused, in particular, on the eight cross-licenses that are observed between competitors, because that's the closest analog to the hypothetical negotiation that we have.

Q. Okay. And did your review of licenses include the AUO licenses that Ms. Chen testified about on the first day of trial?

A. Yes.

Q. Did you prepare summaries in this

case for your review of licenses?

A. Yes.

Q. Okay. Can we go to AUO 267, please.

And what is -- is this one of your summaries?

A. That's right.

Q. What does this summary show?

A. This summary shows -- and again, the first column has been redacted, because that's got the names of the licensor, or I should say the other party to the agreement. These are AUO across licenses.

And so we've redacted the names of the other party. But as you go down the list, you see who is -- who the parties are to the cross-license, the date of the license, the -- perhaps most importantly the payments that were made in the license.

And then on the right-hand side, you have a description of the patents that were transacted. And there are typically portfolios on each side.

Q. Okay. And did you rely on the

summary in forming your opinions in the case?
A. Yes.
MR. TYLER: Your Honor, we'd move for admission of AUO 267 at this time. And, again, as I mentioned yesterday what will be submitted in the record is unredacted.
MR. CHRISTENSON: We'll preserve our objection, Your Honor.
BY MR. TYLER:
Q. And did you do a similar summary for LGD'S licenses?
A. Yes, I did.
Q. Can we turn to AUO 268, please?
Will you tell us what this is?
A. Well, this is the analogous summary for LGD. So it's got exactly the same information, but with LGD's licensing partners instead.
Q. Okay. And did you rely on this in forming your opinions in the case?
A. Yes, I did.
MR. TYLER: At this time, we'd move for admission of AUO 268, Your Honor.
MR. CHRISTENSON: Your Honor,

we'll preserve our objection. If I may, I'd just like to have a standing reservation of objections regarding each of the exhibits offered into evidence from Dr. Putnam's report.

THE COURT: When you say you want to maintain or continue your objection, towards the redaction?

MR. CHRISTENSON: No, Your Honor. It's an objection. As I understand, Mr. Tyler is offering it into evidence, each of the exhibits that Dr. Putnam has from his report. There are going to be, I think, several exhibits.

And rather than continuing to interrupt and object to each one individually, I would just like to preserve our objections regarding each of the exhibits offered in today.

THE COURT: Because it's -- this ultimately goes toward your initial objection of methodology?

MR. CHRISTENSON: Yes, Your Honor. That's correct.

THE COURT: Just so the record is clear, it's not redaction. I think you're both

kind of in some compromising position.

So I'll -- so I'll admit it subject to that methodology objection.

MR. TYLER: Okay. Thank you, Your Honor.

BY MR. TYLER:

Q. So let me now turn your attention to AUO 269. And did you also summarize AUO and LGD's in licenses in this case?

A. Yes. As I mentioned, it's important to analyze all the data.

So in addition to the cross-licenses, we also looked at each parties one-way licenses. A one-way license is when the firm is either licensing in technology of another firm or licensing out its own technology.

And so Exhibit 269 shows the same information for AUO for all of its in licenses. And again, the party from whom it's licensing technology has been redacted.

But we have the title and financial terms of the agreement summarized here.

Q. And did you rely on this in forming your opinions?

A. Yes.

MR. TYLER: I'd move for admission of AUO 269.

THE COURT: It's admitted.

BY MR. TYLER:

Q. Let's go to AUO 270, please. And is this the same thing for LGD?

A. Yes. It is symmetric for LGD, exactly the same information with the partners redacted.

Q. And this is their in and out licenses?

A. In and out licenses, relative, that's right.

Q. So not cross licenses?

A. No the -- not cross licenses, only one-way licenses.

Q. And did you rely on this summary in forming your opinions as well?

A. Yes, I did.

MR. TYLER: We'd move for the admission of AUO 270.

Your Honor, we move for admission of AUO 270.

THE COURT: It's admitted.

MR. TYLER: I am sorry. I didn't hear you.

BY MR. TYLER:

Q. And I'd like to now put up the license summary. This is a demonstrative.

And, Dr. Putnam, did you prepare a summary of LGD's licenses in this case? And this is the cross licenses and all the licenses we've seen so far, but with their trial exhibit numbers on them.

A. Yes. There's three categories of agreements here.

There's the LG cross-licenses. There are one-way licenses, and also their purchasing agreements of various patents and patent portfolios.

MR. TYLER: Okay. And, Your Honor, we had premarked this. It's a summary for his testimony as AUO 1563.

And we would move for admission of the summary as well as underlying exhibits based

on their trial exhibit numbers.

THE COURT: All right. It's admitted.

BY MR. TYLER:

Q. All right. Dr. Putnam, those were quite a lot of licenses. And you mentioned earlier you're looking for consistency of behavior.

Did you find it?

A. Yes, I did.

Q. What consistency did you find among the licenses?

A. Well, the basic pattern that you observe in all these licenses is the parties negotiate a worldwide portfolio license with a lump sum balancing payment from the weaker party to the stronger party for a fixed number of years, or sometimes the life of the patents. Typically five years or, as I said, the life of the patents.

Q. And the cross-licenses you observed that within the competitors -- or there are a lot of one-way licenses up there, too; right?

A. Yes, that's right.

Q. So the cross-licenses, you observed in which category?

A. Well, the cross-licenses are much more commonly found between competitors in the LCD industry. And we actually tested for that to determine statistically whether it's more likely that a firm cross licenses within the industry.

And the answer is that statistically speaking, it is much more likely that you would cross-license.

Q. And did you prepare a summary where we can see that?

A. Yes.

Q. Let's go to AUO 266, please.

A. Yeah.

Q. Can you tell us what this is?

A. I got ahead of myself. What we've got here is the -- either -- these are a summary of licenses within the LCD industry. And, again, we've redacted the names of the other competitors.

What I've shown here is the firms'

market share and their current size of their current patent portfolio. And then the table is divided into LCD manufacturers and then licenses with other firms.

And so the bottom line of all this is that of the -- among the LCD manufacturers, 19 of the 24 licenses that you observe are cross-licenses. Whereas when firms are licensing out of the industry, only 16 out of the 49 licenses are cross-licenses.

And so a statistical test tells us that it's much more likely that within the industry, a firm is going to cross-license.

Q. Did you rely on this summary in forming your opinions?

A. I did.

MR. TYLER: And at this time, we would ask for move to admit 266 in evidence.

THE COURT: It's admitted.

BY MR. TYLER:

Q. So what, if anything, does a consistency that you found in the licensing data tell you about the hypothetical negotiation between AUO and LGD?

A. Well, again, this provides a framework for the hypothetical behavior in negotiation. Under the first principle, if you know what the parties have done in the past, then you are better able to predict what they would do in a hypothetical negotiation. In the agreements that we are looking at, seven of the eight agreements are agreements that involve either AUO or LGD.

So we can be pretty confident that if those agreements are consistent, then the parties would behave with one another consistently with their past behavior.

Q. And besides licenses, did you have any other evidence or proof that would show us that LGD and AUO would act in this way?

A. Well, of course, I also looked at testimony of the corporate representatives on

licensing and what they had to say about their licensing policies.

Q. And did you prepare a summary of some of that testimony?

A. Yes, I did.

Q. Can we turn to AUO 273, please.

It's a lot of information here, but can you tell us what's in this exhibit?

A. Yeah. It's a little hard to read, but what I did was examine the testimony of each of the corporate representatives in various dimensions to characterize how they viewed licensing according to whether they would, you know, do a one-way license or a cross-license, the type of payment that they would exchange between themselves and their competitors and so forth.

And then I gave sample quotations from their deposition testimony.

Q. The second to -- I guess second from the right column is for Joo Sup Kim. Who is that?

A. Mr. Kim is LGD's vice president and corporate representative designated to

testify about licensing matters.

Q. And Ms. Chen on the right column, she's the one who testified for AUO?

A. Yes. We heard from her on the first day of the trial.

Q. You prepared this summary?

A. Yes, I did.

Q. And did you rely on it in forming your opinions?

A. I did.

MR. TYLER: I move to admit AUO 273, Your Honor.

THE COURT: It's admitted.

BY MR. TYLER:

Q. And what did these representatives say about balancing payments?

Q. Okay. Now, did you cross -- I mean, did you chart the cross-licensing balancing payments that you observed in this case?

A. Yes, I did.

Q. Can we go to the next slide?

And what does this slide show?

A. Well, here we have -- now we're getting down to the actual data. These are the eight licenses that I mentioned, these are the balancing payments that are observed in those licenses the parties actually agreed to pay expressed in US dollars, and the present value of US dollars at the time that the license was executed.

Q. Okay. So does each of these represent a separate cross license in the industry?

Q. So it looks like there is a fair amount of variation here. How are you going to use this to predict what might happen between AUO and LGD?

A. Well, remember the first step of the process, it's a three-step process and the first step is to simply predict the balancing payment that would emerge from a cross license between LGD and AUO. So what you want to do is take the characteristics of each of the parties and then try to predict the balancing payment.

Q. Could you do that through analyzing whether one of these was comparable?

A. Well, again, one method of doing this would be to take an agreement and sort of eyeball it and say this is the agreement that I think is most comparable, so I'm going to assign that agreement to the parties.

But as an economist what I am

trained to do is to say let's use all the data, let's take as inputs the characteristics of the parties that they brought to these negotiations and let's see if we can use these characteristics to predict how they actually behaved in the negotiation and what would emerge, what would emerge from it as a final balancing payment.

Q. Do you have any tools to help you with that?

A. Yes. Well, that's where the regression analysis comes in. A regression is simply a way of taking a mathematical equation and fitting it so that it produces the most precise prediction of the behavior that you actually observe. What you do is -- what you want to do in this case is take as inputs the characteristics of the parties and then as an output, you want to predict how they behaved or their -- the net of how they behaved, which is their balancing payment.

Q. How in the world would you know what inputs to use, there is a lot of characteristics to these companies?

A. Sure. But I think Georgia-Pacific organizes the data for us. So what we're going to be concerned with primarily is what the strengths of the parties bargaining positions as they come to the table and that's reflected, for example, in the fourth group of Georgia-Pacific factors that I identified earlier, the parties commercial relationship, and the size of their patent portfolio.

Q. In your work, did you prepare a summary of the raw data that you used as inputs to construct a regression?

A. Yes, I did.

Q. Can we go to AUO 274.

What does this show us?

A. This is actually quite a useful slide. Again, we have on the left hand --

Q. Take that down please. There was one column that was not redacted. It listed the individual paying parties, so if you don't mind, go ahead and tell us what that exhibit showed in the abstract. We'll just go ahead and put it in the record, go ahead and explain what it showed?

A. Sure. Okay. All right. So as I

said, the problem conceptually is to take the parties' characteristics and to predict what they would do in the negotiation. And so what this table summarized is for each one of the licenses, the parties' patent portfolio, the size of the patent portfolio at the time of the license which reflects their bargaining power and the sales of the exposed sales of the other party that their patent portfolio is being aimed at.

So if you think of this as being to use one metaphor as being arrows in a quiver, so two parties are negotiating with each other, what's going to emerge from the negotiation is is determined by the number of arrows in my quiver, which is the size of my patent portfolio, and the size of the target that the other party represents, which is the exposure of its sales. The more it sells, the bigger the target is.

So I guess we resolved our technical difficulties.

So, but...

Q. What does this -- so the second to

right-hand column, are those the actual payments that were made that we charted?

A. Yes, that's the output. So the middle two columns are the number of patents and the sales, that's the inputs. And then the next to the last column is the output, which is what the weaker party actually paid to the stronger party. That's a real number in this negotiation.

Q. Okay. And on the far column, what is that, effective royalty?

A. That's the effective royalty rate. So in these agreements, what's actually happening is that one party is writing a check to the other party for a fixed amount of money. If you want to compare that to a running royalty rate, the way that you would do that is to divide that number by the expected sales so you would get a rate for dollar of sales, that's what an effective royalty rate is.

Q. Did you notice anything about the range of rates here?

Q. Just to be clear, we're talking about --

THE COURT: Do you have an unredacted hard copy of this?

MR. TYLER: Yes, we do. And it's in the binder as Exhibit 274, if you have the big binder. This is actually -- these are actually exhibits.

THE COURT: Right. But I'm -- could you show the clerk where it is and she can pull it out for me.

MR. TYLER: May I approach, Your Honor, and hand these up?

THE COURT: Sure.

(Discussion off the record.)

MR. TYLER: May I proceed, Your

Honor?

THE COURT: Yes.

BY MR. TYLER:

Q. So this is the real data, right, because we're talking about constructing a model but these are the payments that were actually made?

A. Yes. Before you constructed the model or done any analysis or anything like that, this is what you're actually looking at in terms of what happened and what you're trying to explain.

Q. And these are for entire patent portfolios of hundreds of patents; is that correct?

A. Yes.

Q. And did this -- did this range of rates have any, any relevance to your problem of determining what a royalty would be on an individual patent?

A. Well, yes it does. Remember under the fourth principle, the fourth principle is that the asserted patents in this case are parts of a whole, and so in the same way that -- just

the way a slice of a pizza is part of an entire pizza.

So in effect what you have on the right-hand side is the price of the entire pizza expressed as an effective royalty rate, so the rates that you would charge for individual patents are necessarily capped by those rates, so there is a ceiling for the price you would pay for an individual patent or an individual slice of pizza.

Q. And did you prepare this summary?

A. Yes, I did.

Q. And did you rely on it in forming your opinions?

A. Yes, I did.

MR. TYLER: Your Honor, at this time we move for admission of AUO 274.

THE COURT: It's admitted.

BY MR. TYLER:

Q. So you have these inputs of strength and exposed sales, and this is all their sales; correct, exposed sales?

A. Worldwide sales, yes, that's right.

Q. Did you have any other inputs besides these two?

A. Well, what we wanted, our first objective is to explain what happens on average when the parties transact their portfolios. But we're particularly concerned in this case that we're insuring that we predict the behavior of the two parties, you know, the two claimants in this litigation accurately.

So you can imagine that in each one of these negotiations, parties might behave systematically different from each other. So, for example, one party might have a systematically stronger patent portfolio and that would cause it to pay less in a negotiation or to receive more. Or another party might be an especially good bargainer so that would cause it to pay less in a negotiation.

So we're looking for systematic factors that follow the parties around from negotiation to negotiation. And an economist calls those fixed effects.

So what I have done as part of the model is to estimate a fixed effect, one for LG

and one for AUO, so as part of predicting how they actually behave in these negotiation.

Also, I assume that there is this constant that follows the party from negotiation to negotiation and you actually estimate the value that you attach to each party in predicting its balancing payment.

Q. So I thought you were here on

behalf of AUO?

A. Well, I am, but the data say what they do, and you have to just go with what they say. And that's the implication of the fixed effects for the two parties.

Q. So we talked about your inputs, and I want to move now to see what happens when you push the button on your regression analysis?

A. Sure.

Q. If we go to the next slide. What does this new line show?

A. So what I have done here is just overlay on to the actual data the results of the model. And the green line shows how the model predicts the balancing payment that would emerge in each one of these negotiations based on the characteristics of the party that it brings to the negotiation, including for each of the parties here, the fixed effect that they write to that negotiation.

Q. Do you have a summary of your inputs and outputs that made this chart?

A. Yes.

Q. Can we go to AUO 277, please. We

have redactions there.

So what is this summary?

A. Well, this is the actual data that the input data set and at the end of the day in the far right-hand column, the output which is the payment that's predicted. So you can contrast the predicted payment in the far right-hand column with the actual payment that we observed in the data which is the fourth column from the right.

Q. And so the farthest column is the predicted payment?

A. Yes, that's right.

Q. And does this chart, did you prepare this chart?

A. I did.

Q. And did you rely on it in forming your opinions?

A. I did.

MR. TYLER: I move for admission of AUO 277, Your Honor.

THE COURT: It's admitted.

BY MR. TYLER:

Q. So your inputs to your model were

the patent portfolio strength, exposed sales, fixed effects. Do those relate to any Georgia-Pacific factors?

A. Yes. Well, as I mentioned, in the fourth group of factors you got the commercial relationship between the parties which is --

Q. Can we go to slide 21.

A. They're obviously competitors, and remember under the third principle that we want to treat them symmetrically because they operate relatively similar positions in the industry. And then under Factor 15 you're looking at the outcome of a hypothetical negotiation which is determined in part by the bargaining strength of the party or the bargaining power it has and that is determined by the size of portfolio it brings to the negotiation.

Q. Did you do any tests to verify the accuracy of your model?

A. I did.

Q. What did you do?

A. Well, the standard -- in a regression context, the standard measure of accuracy is something called goodness of fit.

And the statistic for that is something called adjusted R squared, what statisticians call this, and an adjusted R squared is a number that represents on a scale of zero to one or from zero percent to a hundred percent the amount of variation in the variable that you're trying to explain that you actually are able to explain using the model, so the most you can explain is a hundred percent, the least you can explain is nothing.

In this case the adjusted R squared for my model is .92, or about 92 percent, which means that I explain all but about eight percent of the variation that we observe in industry balancing payments.

Q. And did you prepare a summary of this analysis, your regression?

A. Yes.

Q. Can we go to AUO 276, please.

And what does this provide us?

A. This is just basically a copy of the computer output. It gives the coefficients that are estimated under the regression which gives the industry average royalty rate, the

fixed effects for the parties and then as you can see the second to the last line it says adjusted R squared of .916, or about 92 percent.

Q. Did you rely on this in forming your opinions?

A. Yes, I did.

MR. TYLER: Move for admission of AUO 276.

THE COURT: It's admitted.

BY MR. TYLER:

Q. Dr. Putnam, you got R squared up here and talk about regression. How can someone without a Ph.D. in economics know that your model is reliable?

A. Well, in addition to the fact that it actually predicts the real world data relatively accurately, I think if you sort of think about the intuition of this, going back to the arrow metaphor, you got a certain number of arrows in your quiver that each side is aiming at the other across the table, and each side represents a target to the other side based on the size of its sales.

And so roughly speaking, the

bargaining power that each party brings to the table is a function of how many arrows it's got and how big a target the other side is to it. And the more arrows you got and the bigger the other side's target, the better you're going to do in that negotiation and either the less you will pay or the more the other side will pay to you.

Q. So how are we going to use your model in this case?

A. Well, the first thing, the first of our three steps is to actually predict a balancing payment between AUO and LG when they sit down with each other based on their characteristics.

Q. And did you do that in this case?

A. Yes, I think there is a slide.

Q. Okay. So did you do this for multiple time periods?

A. Yes. Obviously the parties' characteristics are changing in the sense that their patent portfolios are growing over time and the exposed sales of the other party are growing over time. This is taken from 2004.

Q. Why did you do that in 2004?

A. Because two of AUO's patents, the '629 and the '160 patents, the infringement of those patents began according to AUO in 2004.

Q. And for the other two patents in the case, the '506 and the '157, when did you do the analysis for those patents?

A. 2006.

Q. Did you prepare a summary of the different time periods of your analysis?

A. Yes, I did.

Q. Can we go to Exhibit 275, please. And 275 shows what?

A. Well, here we have overzealous redactions because we have actually redacted the parties to this case.

Q. Okay. Sorry.

A. So the point of this exhibit is that it shows for each of five hypothetical negotiation dates, all between AUO and LGD, the balancing payment that in this case AUO would pay to LGD as of that date as well as the individual claims that each party would make against each other, which results in that balancing payment.

Q. And you have done effective royalty rates for those on the right-hand side?

A. Yes, I have.

Q. And did you rely on this information in forming your opinions?

A. That's right.

MR. TYLER: Move for admission of AUO 275, Your Honor.

THE COURT: It's admitted.

BY MR. TYLER:

Q. Let's go back to your example of 2004. If we go back to slide 22. So looking at this slide, what does this tell you about AUO's claim for the offensive part of this case?

A. So we have accomplished step one, which is predicting the balancing payment. Now we have to take that green circle, which is the mixture of two primary colors, the yellow and blue, and break that down into AUO's claim against LG and LG's claim against AUO. And so that's shown in the next slide.

Q. Okay.

Q. This is the 2004 time frame?

A. That is right.

Q. So you have this at other time frames as well?

A. The previous exhibit shows the calculations for all the time periods.

Q. Now, you darked out the right side. That's LGD's side of the equation?

A. Yes.

Q. And we will be talking about that in a couple of weeks?

A. That's the next trial. That's right.

Q. Okay. So this isn't your measure

of damages.

So what else do we have to do?

A. Well, now we have finished our second step, which is figuring out the portion of the balancing payment that represents AUO's claim against LGD.

Q. Okay. Well, before I go to that last step, I want to ask you a question to talk about the portion strength.

You mentioned that a few times. And you said you looked at the patent portfolios of the parties --

A. Yes, I did.

Q. -- as well as other parties in the industry?

A. That's right.

Q. Did you summarize that?

A. I did.

Q. Can we go to AUO 278?

This one's free of redaction.

It's publicly available information?
A. Yes.
Q. So how did you -- well, what is this first, let me ask you that?
A. This exhibit just shows for the time period 2000 to 2008 for all the major LCD competitors, the sizes of their portfolio as they accumulate patents over time.
Q. And did you compile these lists?
A. Yes, I did.
Q. How did you do that?
A. I used a publicly available commercial database called Delphion.com, which allows you to extract information for each one of these assignees.
Q. Okay. And were you here in Court the first day when Dr. Luo from AUO testified about AUO's patent portfolio growth?
A. I was, yes.
Q. And did his chart match your chart?
A. No.
Q. Why not?
A. Well, remember as part of his

testimony, he talked about, or that first day of his testimony, we discussed that AUO had purchased a number of patents from IBM. It turns out AUO has purchased or acquired other firms and patents other over time. Dr. Luo's chart shows, AUO, the size of AUO's patent portfolio as of the date they acquired the various patents.

My chart shows AUO's patent portfolio as though it had been receiving the patents that it purchased at the time that they issued. So for example, the 2001, we have the IBM patents that AUO purchased in 2005, but they're assigned to AUO in 2001.

Q. And you did the same thing for LG, didn't you?

A. Yes, of course.

Q. At this time -- did you rely on this chart in forming your opinions?

A. Yes.

MR. TYLER: Your Honor, we'd move to admit AUO 278.

THE COURT: It's admitted.

BY MR. TYLER:

Q. Okay. So let's go from the results of your model down to your damages conclusion. And let's go to the next slide.

This is the last step of your analysis; is that correct?

A. Yes, that's right.

Q. Would you explain what we're doing here?

Now, we have to restrict that claim to the portion of it that's attributable to accused sales in the United States. And then of the accused sales in the U.S., we have to further restrict it to the portion that is attributable to the four asserted patents.

Q. Okay. And how do you -- how do you do that here?

A. Well, you basically just have to multiply by two adjustment factors. The first of them is taking AUO -- taking LG's sales and varying out the fraction of LG's worldwide sales that are actually made in the United States.

And then the second step is to -- of those, the set of LG sales in the United States, further take out those sales that AUO has not accused under the four patents.

Q. In this case?

A. In this case, that's right.

Q. All right. So how did you do the -- first, how did you find out the first percentage, the sales in the United States?

A. Well, it's important to remember that AUO typically does not track the place that its LCD modules end up. An LCD module is an input into another good, like a computer monitor or a television set.

So when AUO says its sells an LCD module to Sony, Sony might assemble that module into a television set in, let's say, Mainland China, and then ship it to the U.S. But AUO doesn't track where that television set ends up.

It only knows that it shipped it from China. So you have to -- so it's a two-part process for the module to end up in the U.S., and AUO doesn't track that.

So in order to do that, you've got

to go to an industry standard source, which I think we mentioned previously, Display Search. And Display Search tracks the two parts of this transaction, not the individual module, but it tracks the sales that AUO makes to China and/or to a customer actually which may be in China. And then it tracks the customer sales into the United States.

And so by looking at the fraction of sales that go to the customer and the fraction of the customer sales that go to the U.S., you can infer the fraction that -- of AUO modules, or in this case, LGD modules that end up in the United States.

Q. And did you do that in this case?

A. I did, yes.

Q. Will that number be at the same time for all manufacturers?

A. No, it's not. It's not the same, because it depends on where the customers of each one of the parties in this case sell their products. And that, obviously, varies depending on how they market their products.

Q. And then the second percentage is the percentage of accused products?

A. Yes. So then we have to take that, the sales that end up in the U.S. and figure out what fraction of them are actually accused under one of the four patents.

Q. So it looks like the last step in your flow chart is to determine the value share of the asserted patents. How do you do that?

A. Okay. So we're getting close.

And now we've got to apportion it among the four asserted patents. And to do that, we use this method that I mentioned called count, rank and divide.

Q. Okay. Explain that to us.

A. Sure. It's sort of like you could think of this as being very similar to the problem that you face when you invite people over for Thanksgiving dinner. You've got a certain number of guests.

You've got to figure out how to apportion the food among those guests. And you've got to divide those portions so that each guest's portion adds up to the entire amount of food that you've got.

So the difference here is -- there's a couple of differences. One of them is that instead of having a dinner party for eight, in this case, you've got thousands of patents in the portfolio. And so you've got to find a way of giving them their correct portion.

And you don't necessarily -- you aren't able to look at a single number, which tells you -- I should say you've got to find a

way of assigning a single number to each one of these patents, so that it gets its correct portion.

Q. Okay. I think the counting is easy. We've already seen that.

How do you -- you've got to rank thousands of patents from top to bottom?

A. Yes. So, in the same way that you had thousands of dinner guests, what you might do is look for an indicator that would predict their appetite.

So you might say that the amount that the guest weighs is correlated with how much they eat. So here you've got to find a ranking for the thousand patents in the portfolio, and the ranking that I use is the number of citations that each patent has received in subsequent -- from subsequent patents at issue in the United States.

Q. Well, in your analogy on Thanksgiving dinner, couldn't you just ask people who knew about the folks coming to Thanksgiving dinner, maybe ask some experts how much they might eat?

A. Well, you could. But in this case, you face two problems.

First of all, it's very difficult to -- we don't have enough time or resources to get experts to rank all of the patents in each party's portfolio based on their importance.

And, secondly, there's an element of subjectivity that enters into this. So even if you did ask experts to rank these patents, you're not going to get any two experts to agree on the exact ranking. So you need an objective indicator that does this for you, and get it at least approximately right for all of the patents in the portfolio.

Q. And you said the objective indicator was the number of patent citations per patent?

A. Yes. That's right.

Q. How do you know that's a good measure of importance of patents?

A. Well, economists have been working now for more than 20 years on ways of trying to take large groups of patents and figure out how to value portfolios of patents or weigh them in

some fashion to reflect their value without having to go through and obtain expert advice on each of the individual patents.

Q. So you didn't make this up for this case?

A. No. No. No.

This approach is more than 20 years old. I think it goes back -- I've got an article on the screen. It goes back originally to the classic article by Manual Tracenberg on Patent Citations & Evaluations. That is -- that spawned a whole flurry of research that was on eventually researched in a book published by MIT Press called Patent Citations and Innovations.

I've also worked on the methods to weight patents appropriately, so that you, rather than simply counting them, you assign them their appropriate share in total value.

Q. Okay. When you first mentioned this to me, what I thought was, well, how about patent citations -- there's going to be a whole lot more for an older patent than a younger patent.

So how did you account for that?

A. Well, you have to, obviously, adjust for the age of the patent. So in the same way that when you look at your child's height on a height-weight chart and say what percentile does my child fall in, you look at the chart for the -- that corresponds to the age of your child.

So my child falls in the 70th percentile for six-year-olds. If your child is eight, then you use a different one, because all eight-year-olds are taller on average than all six-year-olds.

So in the same way, we use a different chart that ranks the patents based on its age and adjusts for that fact in computing its overall ranking.

Q. So you ranked all the AUO patents in this case?

A. All the AUO patents and all the LGD patents. That's right.

Q. Okay. So does this ranking of patents, the way you approached it, does that take into account any of the Georgia-Pacific factors?

A. Yes. The third factor refers to commercial advantages of invention, the nature of the invention and the benefits, the advantages of the invention over old modes and devices, and so forth. And so the number of citations is correlated with these commercial advantages, because truly pioneering inventions typically spawn other inventions that build upon them and improve upon them.

And these later inventions generate citations back to the pioneer. So the number of citations that a patent receives is correlated, on average, with the commercial significance.

Q. So once you ranked them, how did you divide them up? Did you just average them?

A. No. And the last step, once you've got a ranking from Number 1 to Number 1000 or whatever, you have to go back to the economic literature and look at the literature on the distribution of patent values. And that literature says that if you know -- for any size patent portfolio, if you know the number of patents in that portfolio, and you know the

ranking of where a particular patent falls in that portfolio, then you can assign a share of the entire portfolio's value, whatever the aggregate value is. You can figure out the share based on the literature on the distribution of patent values.

Q. Okay. And so once you have that share, you can determine what?

A. Well, basically we've got the size of the pie. We've now got the share of the pie that's attributable to each patent.

You multiply those things together, and you get the size the actual piece of the pie that each patent gets. And that's our damages number.

Q. And you did that in this case?

A. That's correct.

Q. For each of the patents?

A. For each of the four patents. That's right.

Q. All right. So these are the numbers you came up with that value share on that analysis?

A. Yes.

Q. What if you underrepresented the importance of the patents due to the fact that the patent citation method maybe was unreliable after all these patents were actually chosen to be asserted in this case?

A. Yes.

Q. You take that into account?

A. Well, the -- I know each party says that its patent is among its most important patents. The objective indicator of citations actually doesn't support that claim for any of the patents in this case. They don't rank even within the top five percent of all patents.

But, you know, citations are not a perfect measure of commercial significance. And so I assumed instead to, as a check on this, so that each patent fell within the top five percent. And I assigned it a share value that would be appropriate for the average top five percent.

So, in other words, I just disregarded citations entirely and said, Let's assume the patent is important, place it in the top five percent and then figure out the value

that you would get.

Q. So then in your Thanksgiving meal value, you assume the top five percent eaters?

A. Yeah, exactly, that are the heavy eaters. Whether they weigh a hundred pounds or 400 pounds, we're going to assume they're a heavy eater and assign them the heavy eater sale.

Q. Did that change your results?

A. Yes, of course.

Q. Go to the next slide. And what does this show?

Q. So the two value shares together provide you a range under this method; is that right?

A. Yes. That's right.

Q. This is the range?

A. Yeah. So this just summarizes the results for the two methods for each of the four patents, or I should say two assumptions under the single method for each of the four patents.

Q. Now, this method industry price method, did you do another method to check these values?

A. Yes.

Q. And is the other method going to take us as long to go through?

A. No. We can actually take advantage of all the work we've done up until now and go -- it goes very quickly.

Q. Okay. So what's your other method, Slide 33.

A. Well, going back to -- well, I call it the apportionment of LGD's profits. And for the four asserted patents what you want to do is conceptually take a different pie.

We're going to change pies and instead of looking at AUO's claim against LG, we're going to look at LG's profits on the accused sales and then apportion that among the four patents.

Q. Okay. Now, we've discussed, I think, your group one, group two, and group four of your Georgia Pacific factors?

Does this relate to any of the Georgia-Pacific factors?

A. The group two --

Q. Group two?

A. -- is the factor related to profitability. I think it's on the next slide.

And so, in particular, we have the established profitability of the patented product and portion of the defendant's profit that's credited to the invention.

And this is under Factor 13 as distinguished from the defendant's own contributions. So what we're particularly concerned with here is separating the portion of LG's profits that are attributable to AUO's patents and the portion of LG profits that are

attributable to LG's own patents.

Q. Okay. You're saying profits a lot. You already said you are going to conduct a reasonable royalty analysis.

Is this a lost profits analysis?

A. No. These are -- as I said, what I've listed here are the four Georgia-Pacific factors, which are directed to computing a reasonable royalty. But these are four factors that tell us to look at the profits of the patented products and the share of those profits that should be -- that are used as an input in determining what would emerge from a hypothetical negotiation.

Q. How would this analysis fit into a hypothetical negotiation?

A. Well, you might think of it this way: The first method that I looked at examines negotiations between parties, and that's -- that reflects what a seller is willing to sell its invention for or its portfolio, or in this case four members of its portfolio.

Here we're looking at it from the buyer's side. And this reflects what a buyer

would be willing to pay as a share of the total profits that the buyer earns for the use of these particular patents.

Q. Okay. So what's the first step in your analysis here?

A. Well, as I said, we're going to start with LG's profits. And so we're just changing the pie. It took a lot of work last time to get to the appropriate pie.

Now, we can read the LG's income statement and simply add those up and figure out what their profits are. So --

Q. Did you prepare a summary of the profits --

A. Yes, I did.

Q. -- in this case?

Please turn to AUO 283, please.

What is this?

A. Well, this is just a standard income statement for the period 2001 through 2008 that shows as a top line LG's actual sales worldwide. It subtracts other costs and the bottom line is the profits earned by LG over this period.

Q. And did you prepare this information?

A. Yes, I did.

Q. From publicly available resources?

A. Yes.

Q. And did you rely on this information in forming your opinions?

A. Yes.

MR. TYLER: At this time, we'd move to admit AUO 238, Your Honor.

THE COURT: It's admitted.

BY MR. TYLER:

Q. So after you have the profits information, what do you do next?

A. Well, the LG's profits are attributable to many factors. Not only just the patents, but other intellectual property and other things that a company like LG does to make money.

It's got, you know, the good sales staff. It's got a brand name. It does advertising and that sort of thing.

So what I've done is assume conservatively, again, based on economic

literature that half of LG's profits are attributable to patents. And so we're going to take the total profits up into two pieces and say half of the profits are -- half of the profits are caused by the patents that it uses in its LCD modules.

Q. Past work in your career in looking at parties' profits as they related to patents, did that inform your decision here?

A. Yes. I mean, this is actually a conservative assumption. There's some other work that I did that shows that, if anything, the number might be less than this.

So I'm assuming conservatively that patents accounted for half of the profits.

Q. Okay. And let's turn to AUO 265. And what is this summary?

A. This just shows the calculation that takes you from worldwide sales. So on the right-hand side, we have AUO, as the plaintiff, which means we're looking at LGD sales as the defendant.

It takes you from worldwide sales subtracts out foreign sales and non-accused

sales to get to U.S. sales.

Then computes the profits on those sales. Takes half that profit.

Q. Okay. Thank you.

And did you rely on this summary in forming your opinions?

A. Yes.

MR. TYLER: At this time, Your Honor, we move for admission of AUO 265.

THE COURT: Admitted. It's admitted.

BY MR. TYLER:

Q. Before we leave this, the left side of this is what we're going to see in two weeks; right?

A. Yeah. Under the third principle, this is a symmetrical analysis. So we do exactly the same for LGD.

Q. So now we have the profits attributable to LGD's patents, and we talked

about accused products and we've taken down the size of the pie. What do you do next?

A. Well, now, we take advantage of all the work we did previously and simply apply the count, rank and divide method to get the share of those methods that's attributable to each one of the four asserted AUO patents. So it's exactly the same thing.

Q. Is there any difference in the way you did the shares for this particular analysis?

A. Well, there's only one difference and that is that previously when you were looking at AUO's claim against LGD across the bargaining table, you were ranking the four patents within AUO's portfolio to determine their contribution to AUO's total claim.

Now, you're looking at the profits that LG has earned. And so what you want to do is put the AUO patents within the LG portfolio and figure out what contribution to LG's profits AUO's patents made. So you're ranking AUO's patent within LG's portfolio.

Q. So your Thanksgiving guests now went over to LGD's table?

A. House. That's right.

There's a different number of guests and our -- the four patents don't change in size, but their ranking within that set of guests would change.

Q. Okay. Did you summarize how you did the value share analysis for the profitability?

Q. Actually go to the -- go to the next slide. That's fine.

And on the right side, is this your conclusions?

Q. So on the portion on the profitability side, you have testified before about this method?

A. Yes, on the count, rank and divide method, I have testified before.

Q. And in front of which judge?

A. That was -- I mentioned last year I testified in front of Judge Sleet, and I testified about this method.

Q. Okay. And so does this have your conclusions in the case?

A. Yes. This basically summarizes my opinion as to the damages that one would observe for one -- the range of damages that in which the award should fall for each one of the four asserted patents.

MR. TYLER: Your Honor, we premarked this conclusion slide as AUO 1576, and

we would offer this into evidence right now.

THE COURT: It's admitted.

BY MR. TYLER:

Q. So I want to ask a few questions about your conclusion, sir.

A. Okay.

Q. Are you telling us that these patents that AUO chose to sue in this case are only worth anywhere from a few thousand dollars to a few million dollars?

A. When you say the value of patent, let me be clear what you mean. The objective in this case is to figure out what LG would pay for the right to use these patents in the United States during the damages period. So that's actually a small fraction of these patents' total value.

If you think about the entire value of the patent, it's the value over the entire lifetime potentially between all the competitors in the industry, LG is only about one-sixth of the industry, and these damages periods are only about one-fourth of these patents' lives on average, so if you were to --

so you got one-fourth of one-sixth of the total value being represented here by these claims of AUO against LG, if you were to multiply that by twenty-four, you get a better estimate of what the value of these patents are as an asset to LG.

Q. Did you make any sanity checks to make sure that your numbers were right as

compared to the numbers LGD is putting up in this case?

A. Yes.

Q. And what did you do?

A. Well, the -- the second principle that I articulated at the beginning is it's important to analyze all the data. So one of the things I did was to go back to what people actually did in this real world to see whether these numbers were consistent with the rates that are paid not for entire portfolios of patents, but when you're actually licensing individual patents.

Q. Did you summarize those in-licenses that you now analyzed?

A. Yes, I did.

Q. I think we looked at the exhibit earlier, turn to AUO 270.

We saw this earlier?

A. Yes.

If you --

Q. Does that fall within your range?

A. Yes, exactly within the range that's articulated between the two methods that I proposed.

Q. Are you just cherry picking one that fits your analysis?

Q. What about when LGD bought patents, not just license them, did you look at

that as well?

A. Yes, I did. Again, I think we have seen -- well, there is an exhibit that summarizes that.

Q. Let's go to AUO 272, please.

What is this summary?

A. Well, this is a similar summary which shows transactions that LGD engaged in where they actually purchased the patent. Of course, when you purchase a patent, you're purchasing all the right, title and interest in the patent, you're not just simply licensing the right to use it, so you would expect to pay more for the entire patent.

Q. On the far right-hand column you summarize the per patent?

A. Yes. Again, we have the actual payment in present value terms.

Q. Far right column. Thank you.

A. Yes.

So this sort of -- this makes it easier to see. You got the number of patents being transacted including some of the patents that have been asserted in this case, the

payment that LG made for those patents in present value terms, and then the average payment per patent which is just the total payment divided by the number of patents.

Q. Did you rely on this summary in coming to your conclusions in the case?

A. Yes.

MR. TYLER: At this time, Your Honor, we would move to admit 272.

THE COURT: It's admitted.

BY MR. TYLER:

Q. Now, Dr. Putnam, in your expert report, you have made a comment about either in this case, the overall case that if Mr. Cobb's valuation method is going to be correct, it needs to apply equally, or if yours is correct,

it needs to apply equally. What did you mean by that?

A. Well, under the third principle that I mentioned at the beginning this is a symmetrical analysis so each party is sitting across the table pointing patents at the other side. If you're going to -- regardless of the method that you choose to assign value to these patents, it's got to apply equally to each sides' patents against the other.

I happen to disagree with all of Mr. Cobb's analysis, but if you were to adopt that analysis, it has to apply symmetrically to AUO as it would to LG.

Q. Why should it apply symmetrically, LG patents are worth a whole lot more than AUO's?

Q. Were you at Mr. Cobb's deposition?
A. Yes.
Q. What method is he advocating in this case?
A. He says that you should apply a two percent running royalty to each one of LG's asserted patents.

A. Yes.
Q. You did that for your hypothetical negotiation as well?
A. Yes, I did.
Q. In Mr. Cobb's deposition, what type of license did he think that AUO and LGD would agree to if they sat down in the real

world?

A. He said in the real word that the parties would agree to a worldwide portfolio wide cross license agreement.

Q. Did he apply any of the Georgia-Pacific factors to the AUO patents?

A. No, he said he didn't.

Q. Did he determine an appropriate royalty rate for the AUO patents?

MR. CHRISTENSON: Your Honor, I'm going to object to this line of questioning because I think it mischaracterizes Mr. Cobb's testimony. He hasn't testified yet. This goes to the later part of the trial regarding our patents after Mr. Cobb has had an opportunity to offer his testimony.

THE COURT: I'll overrule the objection.

MR. TYLER: Pardon?

THE COURT: I'll overrule the objection.

BY MR. TYLER:

Q. Did he determine an appropriate royalty rate for AUO's patents?

A. He did not.

Q. Did he have an opinion as to the appropriate negotiation date for AUO's patents?

A. He said he didn't.

Q. Did he identify any alternatives to AUO patents?

A. He said he wasn't aware of any.

Q. Did he have any ideas on how many fundamental patents there were in the LCD industry as a whole?

A. He had no idea as to either the number of fundamental patents or the number of any patents.

Q. Did he indicate in certain situations that his two percent rate could apply as an appropriate royalty to AUO's asserted patents?

He first review any of the literature that you identify to us in the Court.

A. He said he hadn't.

Q. Did he believe that the patent

citations the way you use it could be an objective indicator of the importance of a patent?

A. He said it could be an indicator, yes.

Q. Is Mr. Cobb here today?

A. I believe that he is.

Q. Back there in the corner?

A. That's right.

Q. Now, I talked about effective royalty rates. Let's go to AUO 271. What do we see here?

A. This chart shows a matrix of licenses within the LCD industry. So we have seen a version of this previously. Again, the names of all the other competitors have been redacted except for AUO and LGD.

What the matrix shows is the payment between the two competitors as the outcome of a -- their actual cross licensing negotiations. The difference is that in this case, I have expressed the payment not as the actual lump sum payment that one party paid to the other, but as a percentage of sales in these

agreements. So it's the effective royalty rate or the equivalent to a running royalty rate that you actually observe in the industry.

Q. So this is real data in that little square box we see between AUO and LGD, those are all your hypothetical negotiations?

A. Yes, that's the effective royalty rate that's implied by the model that I predict as an outcome of the negotiation between LGD and AUO.

Q. At various time frames?

A. At various time frames, that's where it varies from .17 to .46.

Q. And the other royalty rates?

A. Yes, that's right. We have seen this previously, it varies between .1 percent on the low end to the .5 percent on the high end.

A. Yes. As you can see the outcome of the model that I presented falls squarely

within the range of rates that we observed in.

A. Yes, this is across the entire portfolio.

Q. What would this tell you about rates for individual patents in the industry?

A. Well, again, going back to the pizza analogy, this is the price of the entire pizza, so that acts as a cap on the price that you would pay for a slice of pizza. A slice can't be worth -- in the same way that if a pizza cost $10, a slice of piece can't cost more than $10.

One of the patents in a portfolio of patents can't be worth more on an effective.

A. Yes, we relied on LG's actual behavior.

Q. And those involve LG patents that are asserted in this case; correct?

A. Yes, they have licensed the same patents as part of a portfolio.

Q. Does this tell you anything about Mr. Cobb's two percent slice of pizza?

A. Well, again, Mr. Cobb thinks that.

Provide you any sort of upper bound on what could be an appropriate royalty rate.

A. Well, if you were going to assign a running royalty, which again I think is not.

A. Yes.

MR. TYLER: Your Honor, we move 271 in evidence.

THE COURT: It's admitted.

BY MR. TYLER:

Q. And did you calculate the accused LGD sales in the case?

A. I did.

Q. Can we go to AUO 284, please. And what does the summary in 284 provide for us?

A. Well, this just shows the royalty base starting with AUO's total worldwide sales

over the infringement period.

Q. This is for the accused -- the four AUO patents in this case?

A. Well, line A just to be clear, line A is total sales worldwide, and then within the US, and we'll get in a moment to what we mean by in the US. Line C is the subset of sales that AUO is accused under these four patents, again worldwide, and then restricted to the US.

Q. And the column, the second column there, US sales, what does that show?

A. So using the method that I described previously, which found that 24.7.

A. Well, here we have other measures of US sales, so what I have called direct US

sales are sales made by the LG parent company into the US, either directly or through its subsidiary, which is referred to as LGPLA.

Q. So you calculated the royalty base as not just doing a percentage, but also the evidence shows direct sale into the United States?

A. Yes. Yes. These are actual -- without going through the two-step leg via China or whatever, these are the transactions that show direct sales into the US.

Q. And did you do this for each of the asserted patents?

A. Yes, I did.

Q. Can you go to the next page of this. And this is Schedule A of this same exhibit. And what does this show?

A. Here we have for each of the asserted patents, the corresponding figures, worldwide sales, US sales, estimated by the display search public data source, direct sales measured as the sum of sales into the US plus sales by -- to LG's subsidiary, and then only direct sales into the US.

Q. And dividing up these sales, did you have to study the transaction flow of the products into the United States?

A. Yes.

Q. And did you prepare a summary of the documents or some of the transactions, sales documents that helped you to understand the transaction point?

A. Yes, I did.

Q. Can we go to the summary of sales. And this has been premarked as AUO 1562. What does it show?

A. Well, this is just a summary of documents that show how LG interacts with its US subsidiary and with its US customers in basically documenting how the product ends up -- starts out in Seoul and ends up in the US.

Q. And did you review these documents in forming opinions in this case?

A. Yes.

MR. TYLER: At this time, Your Honor, we would move for admission of AUO 1562, which is a summary as well as the underlying documents.

THE COURT: Admitted.

MR. CHRISTENSON: We reserve our objections.

BY MR. TYLER:

Q. Can we go back to the previous slide, exhibit AUO 284. And go to the schedule A. So if you're going to -- if you're going to apply Mr. Cobb's analysis, what's the math that you do?

A. Well, here we have the US royalty base for accused products under each one of the four patents. So if you were going to take -- use Mr. Cobb's method, which is to multiply a royalty base times a royalty rate, then this gives you the appropriate royalty bases that you would multiply that rate by, once you resolved the question of what constitutes a US sale.

Q. So direct infringement would be multiplied by the third column?

A. Yes.

Q. And inducement theory on the second column?

A. Yes.

Q. You're not opining on inducement,

are you?

A. No. That's a liability question and I have no opinion about that.

MR. TYLER: We at this time move 284 into evidence, this particular slide we have been looking at, Your Honor.

TH COURT: It's admitted.

BY MR. TYLER:

Q. So I'm just about through, Dr. Putnam. We have covered a whole lot today. But I do want to take us back to where we started. Is your analysis based on Georgia-Pacific factors?

A. Yes, that's right.

Q. Have you prepared a brief summary about that?

A. Yes. I think if you go back to the four principles that I articulated.

Q. Did you prepare a summary of all your exhibits in this case?

A. The exhibits, yes. I'm sorry, the Georgia-Pacific, yes, I did.

Q. AUO 294, please.

And what is this summary?

A. Well, here I have just grouped the fifteen Georgia-Pacific factors as I have said previously into, you know, licensing conduct and so forth. I have listed the individual factor and then summarized the evidence in my conclusions with respect to that factor.

Q. And did you rely on this information in forming your opinions?

A. Yes.

MR. TYLER: At this time we move AUO 294 in evidence, Your Honor.

THE COURT: It's admitted.

BY MR. TYLER:

Q. So let's go back to your final slide, slide 38. Now, you provided a range for potential hypothetical licenses, what you would pay for that. Do you have any guidance for the Court in actually picking a number, an actual number for the damages?

A. Yes. I think the number should fall obviously within the range I have articulated. Of course, you have to acknowledge there are limits of your prediction with respect to measuring the value of the patents in this

case, so the Court will have also -- has heard and will continue to hear evidence on the commercial advantages and the technical advantages of each of these inventions.

So what I would do is weigh that evidence and within the range move toward the lower or the higher end of the range depending on the Court's aggregate determination as to the importance of that invention relative to its alternatives based on the rest of the technical evidence.

Q. And can you summarize for us why it is that you think a range of a few thousand dollars to a few million dollars would be the appropriate hypothetical payment that LGD would make to AUO for the individual patents?

A. Well, I think it's important to go back to the principles I articulated in the beginning in evaluating these conclusions. The first one is that the best prediction of what people would do in a hypothetical negotiation is what they actually have done. And so when you look at their cross license agreements as well as their one-way agreements that they have

actually entered into, the numbers that I proposed are exactly consistent with the actual agreements.

Secondly, you have to analyze all the data, which means that you have to look not only at the four asserted patents in a vacuum, but you have to look at them as part of a portfolio and look at all the agreements pertaining to all the patents and not just cherry pick a few.

The third principle is that the analysis has to be symmetric, so it has to apply equally when you're sitting on AUO's side of the table as it does when you're sitting on LGD's side of the table. And the analysis that I proposed exactly does that and comes up with --

Portfolio, and so the whole acts as a ceiling on the parts, and the parts have to add up to the whole. And again, if you add up

these numbers and did the same thing for all of AUO's patents, what you would get is the whole of AUO's claim or the whole of LG's profits, and that's an important conceptual and practical constraint in evaluating whether these numbers are accurate or not.

Q. Now, you're going to be back here in a few weeks testifying about LGD's case, and how are you going to square then what you're doing now?

A. Well, the method that I'm going to use is going to be exactly the same. We'll do the same calculations and, but obviously the data will change because in that case we'll be talking about the four LG patents, we'll be talking about AUO's royalty base, we'll be talking about the share of value that LG's patents command as a fraction of LG entire portfolio. So the method will be identical.

For that reason, though, it's important to emphasize that the conclusions that

THE COURT: All right. I think we'll take a little break here and come back in fifteen minutes.

(A brief recess was taken.)

THE CLERK: All rise.

THE COURT: All right. Be seated, please.

Ready to proceed?

MR. CHRISTENSON: Thank you, Your Honor.

BY MR. CHRISTENSON:

Q. Dr. Putnam, good morning.

A. Good morning, Mr. Christenson.

Q. Now, to value AUO's claim, you first estimated the value of AUO's entire portfolio measured against accused U.S. sales of LG Display; correct?

A. Well, when you say the "entire portfolio", I measured the value of AUO's portfolio as directed against LG. That's right.

Q. Right. And can we see your Slide 25, please?

Your Slide 25 summarizes that conclusion?

A. Yes, that's right.

Q. And based on your analysis and the formula that you used, the fair maximum value in

Q. And as part of your analysis, you also considered the value of each party's R & D stock over time; right?

A. I -- I did that as a check to estimate the value of the entire portfolio as against all competitors worldwide. Yes.

Q. Let's look at your Exhibit 19 to your expert report. This is your calculation of AUO's R & D stock value over time; right?

A. Yes.

Q. And if we look at the year 2006, you have the value you calculated for AUO's R & D stock as $443 million?

A. That's correct.

Q. You did a similar analysis for LG Display?

A. That's right.

Q. That's your Exhibit 20?

A. That's right.

Q. In Exhibit 20, we can see that you calculated for the same year 2006, the value of LG Display's research and development stock at

A. Yes.

Q. And, again, for that same year, you valued LG Display's R & D stock at in excess of $2 billion; correct?

A. That's right.

Q. But you didn't start to credit LG Display's R & D stock until 2002; correct?

A. I didn't have the data. That's right.

Q. So you didn't intend -- you didn't intend to give AUO a two-year head start there; that was just based on the data you were able to find.

A. That's right. And based on level of expenditures, the numbers by 2007 would be essentially the same. But you're right, I didn't -- I did the best that I could with the data that I had.

Q. And let's look at a slide reflecting your analysis of R & D stock values between 2002 and 2007, you calculated that LG Display's R & D stock had substantially increased in value over time; right?

A. Well, they both have. But, yes, proportionally it's about the same.

Q. LG Display's R & D stock has substantially increased over time; right?

A. It has substantially increased. Yes, that's right.

Q. And even giving AUO that two-year head start, LG Display's R & D stock value is about four times larger than AUO's R & D stock based on your calculations; correct?

A. As of 2007, that was true. Yes.

Q. Dr. Putnam, you testified about your predicted outcome of a hypothetical cross-license of all patents on AUO and LG Display's entire portfolios; right?

A. Yes.

Q. And I think Slide 22 that you presented addresses that analysis; is that right?

A. Yes. That's right.

As of 2004.

Q. So this shows your model, your economic model of formula that you used to predict the outcome or what might have happened several years ago; right?

A. At the time of the hypothetical negotiation, yes.

Q. In 2004?

A. That's correct.

Q. And we agree, Dr. Putnam, that in any cross-license deal between AUO and LG Display, AUO would have to pay LG Display; right?

A. Well, when you say "would have

to", I think what you're saying -- what you mean to say by that is that the model would predict that.

And based on the characteristic of the parties, I would agree with that statement. Yes.

Q. So AUO would have to pay LG Display a lump sum balancing payment, a running royalty, or some combination of those two; correct?

A. That sounds right.

Q. And the '506 patent issued in August 2006?

A. Sounds right.

Q. And in a more recent cross-license, say in 2007, AUO would pay more money than that to LG Display; right, based on your model?

A. Yes, that's correct.

Q. Because from 2004 through 2007, LG Display's patent portfolio has substantially increased in size?

A. Well, yes, both sides are increasing the size of their patent portfolios. And so what happens is that each side's claim against the other is increasing, and the net of that is that the balancing payment would increase.

Q. And so you agree with me that from 2004 through 2007, LG Display's patent portfolio has substantially increased; right?

A. Yes. Again, I think that AUO's is actually increasing at a faster rate, but your

statement is correct.

Q. Well, we'll get to that, but -- in a moment. But this chart reflects the growth of LG Display's patent portfolio over time; right?

A. Yes.

Q. And in your analysis, one of the things you considered is the number of patents that each side owned at the time of the hypothetical negotiation on a cross-license?

A. That's right.

Q. And since 2004, Dr. Putnam, LG Display's patent portfolio of U.S. patents reflected in this chart has substantially increased every year; right?

A. Yes.

Q. And as the portfolio size has increased, the value of LG Display's portfolio also has increased over time; right?

A. I would expect that, yes.

Q. In fact, your analysis proves that; right?

A. Well, that's --

Q. Your Exhibit 15.1 confirms that; right?

A. As -- yeah, I think. I don't remember the exhibit number off the top of my head.

But, yes, as the portfolio size increases, the number of arrows in your quiver goes up. Then the value of your portfolio goes up. That's true as a general statement.

Q. You mentioned a minute ago, you also looked at the number of patents that AUO acquired over time; right?

A. Yes.

Q. And you acknowledged, in your direct testimony, that some of the patents weren't actually owned by AUO at the time that you listed them; right?

A. Well, at the time that they issued, they were not owned by AUO, but AUO acquired them. They acquired the right to sue for past damages.

So they, in effect, acquired the benefit of the issue date. But it's true, they weren't in AUO's possession as of that date.

Q. But you still credited them as if they were in AUO's possession as of that date;

right?

A. For the purpose of the outcome of the hypothetical negotiation, yes, because they represent a claim against another party in this case, LG.

Q. Well, at the time they were acquired, they weren't asserted against LG, were they?

A. No, but AUO acquired the right to sue LG for damages going back to the issue date.

Q. And all of those acquired patents are not involved in this case, are they?

A. I think there's only two.

Q. Now, since 2004, again, looking at the slide, the size difference between LG Display's portfolio and AUO's portfolio has increased over time; right?

A. Well, it depends on how you measure. I would look at the ratio.

And the ratio when we start out about being three times as big and now it's about two and a half times as big. So actually, relatively speaking, the difference has shrunk.

But absolute terms, you're right.

Q. In terms of actual numbers, Dr. Putnam, the size number has increased?

A. In terms of actual numbers, that's correct.

Q. Because in 2004, the time that you did your hypothetical cross-license model, LG Display had 524 more U.S. patents than AUO; right?

A. That's right.

Q. And in 2009, LG Display has 1,570 more U.S. patents than AUO; correct?

A. It looks -- the figures look right to me.

Q. And, again, at the time -- at the time of the hypothetical negotiation that you did for cross-licenses on all patents, 2004, LG Display owned, you say, 789 U.S. patents; right?

A. Yes.

Q. But by 2006, LG Display's U.S. patent count, according to you, had increased to 1,620 U.S. patents?

A. I think that's right.

Q. So by 2006, LG Display had more than doubled the number of U.S. patents that LG

Display had on the date you used for the hypothetical cross license?

A. As had AUO, that's right.

Q. And, again, your research suggests that as the number of patents in a portfolio increases, the royalty rate for that portfolio increases at an almost linear rate; isn't that right?

A. All things equal, that's the way that people in the industry behave. That's true.

Q. So we agree, again, that AUO's balancing payment to LG Display today would certainly be more than a balancing payment that you illustrated in 2004; right?

A. Well, if you were predicting based on the characteristics of the model, I think that would be true. Obviously, that's not a question that I addressed as part of damages, which are retrospective and determined on the date of hypothetical negotiation.

But that would be an implication of the model if you were to apply it today.

Q. And given the fact that two of

AUO's patent didn't issue until after 2004, it could be appropriate to do a hypothetical negotiation looking at more recent data when those patents actually existed; right?

A. And that's what I did. The exhibit -- I also calculated this for 2006, and as you pointed out, the balancing payment as well as each side's claim against the other are larger in 2006 than in 2004.

Q. And the net difference increases in favor of LG Display over time as well; correct?

A. Well, when you say "net difference", I think if you mean -- if you mean the balancing payment increases, then the answer is yes.

Q. Yes. Now, Dr. Putnam, you did a very interesting study regarding which companies in the LCD industry owned the most significant LCD patents; do you remember that?

A. Yes.

Q. And you briefly alluded to that. I'd like to explore that a little bit more in detail with you.

That was your Exhibit 11.1 to your report; correct?

A. Yes.

Q. Let's look at redacted Exhibit 11.1?

Let's take the blow up off for just a second. So looking at this redacted version of Exhibit 11.1, can we increase that a little bit -- again, this is an exhibit that you prepared as part of your analysis; correct?

A. Yes.

Q. And the title of your -- the title of your Exhibit 11.1 at the top is you characterize this as the rate of patent portfolio strength and balancing payments for cross licenses in the industry; right?

A. That's right.

Q. You did this to rank the patent portfolios of AUO and other LCD companies; correct?

A. Well, I ranked -- I computed the number of top five percent patents that each firm had, that's right.

Q. Just to step through your

analysis. To do your ranking of which -- you did a ranking of which companies own the top LCD patents; right?

A. As measured by patent citations, that's correct.

Q. And you evaluated approximately 9,000 LCD patents based on number of citations adjusted for age; correct?

A. That's right.

Q. And that allowed you, Dr. Putnam, to identify the top five percent or roughly 450 top LCD patents?

A. Again, that's correct.

Q. And you then determined how many of each of those top five percent patents is owned by nine LCD companies identified in your Exhibit 11.1; correct?

A. Yes.

Q. And the heading here on the left-hand side of your Exhibit 11.1 is 95th plus percentile patents; right?

A. Yes.

Q. So again, we're talking about the top five percent of all LCD patents?

A. That's correct.

Q. And this shows the -- this Exhibit 11.1 shows the negotiating positions of the various LCD companies relative to each other; correct?

A. Well, what it shows is the list of top five percent patents that one might think that the number of -- one hypothesis would be that the more important patents that a company has, the better its bargaining position.

I actually used this to estimate my model and I found that it didn't pick the data as well as simply using all the patents in the portfolio.

So while the hypothesis is plausible, it doesn't fit the data as well.

Q. Dr. Putnam, as you already testified on direct, the weaker party pays the stronger party in a cross license; right?

A. Yes.

Q. And this is a way to assess which parties are stronger and which parties are weaker; right?

A. By one measure, yes.

Q. And this is the measure you used; correct?

A. Sure.

Q. This is your measure?

A. Yes.

Q. And as part of your measure, you determined that at the top on the left, LG Display owns 80 of the top LCD patents in the world; correct?

A. That's what I estimated, yes.

Q. And if you look down toward the bottom, you can see you estimated that AUO owns only sixteen of the top LCD patents; correct?

A. Yes.

Q. And just to be clear, none of those sixteen patents are in this case; right?

A. I'm not sure that that's true. There may be one AUO patent that made the top five percent, so I'm just not sure. It's no more than one, and it may be zero.

Q. Did you testify in your deposition that none of the sixteen AUO patents are involved in this case?

A. Yeah, I did say that. And then I

went back and actually looked at the data and see where they rank, but I hadn't looked at any of the individual patents. Once we selected the patents for trial, I think I did see that. I think I remember seeing in retrospect one of the patents appearing in the top 96th percentile. It won't make any difference in my conclusion, so I won't fight you on -- that was my impression at the time and my opinions don't change whether it's true or not true.

Q. But in any event, LG Display, according to these calculations that you did, owns five times as many top LCD patents as AUO owns; right?

A. Your arithmetic is correct.

Q. And this is a way that you ranked LG Display and AUO in terms of their patent portfolio strength and value?

A. Well, I wouldn't say that it's a way that I ranked the portfolio value, it's a way of ordering the company to explain the effective royalty rate that they pay in the industry. And it turns out that the rates that they pay are consistent with this ranking. But

I wouldn't go further than that.

Q. Well, previously you went a little further. You gave a deposition in this case on April 22nd, 2009, that's when I deposed you; correct?

A. Yes.

Q. And on page 184, line 18, didn't you testify as follows, Dr. Putnam:

"QUESTION: So this is a way to rank" -- we were talking about Exhibit 11.1, you remember testifying on Exhibit 11.1 at your deposition?

A. Yes.

Q. "QUESTION: So this is a way to rank LCD companies in terms of their patent portfolio strength and value?

"ANSWER: Broadly speaking, I would agree with that statement."

Was that your testimony?

A. Yes. And it's still true. Broadly speaking I still agree with it.

Q. So broadly speaking, this is a way to rank LG Display and AUO in terms of their patent portfolio strength and value; correct?

A. For the purpose of analyzing the rates they actually pay in the industry, yes.

Q. And as shown in your Exhibit 11.1, LG Display holds one of the top portfolios in the industry; right?

A. It ranks near the top of that list, yes.

Q. And AUO, sir, is listed seventh out of nine LCD companies; correct?

A. That's true.

Q. In fact, the only companies lower than AUO in patent portfolio strength and value are CMO and CPT; correct?

A. On that list, that's true.

Q. On your list; correct?

A. Yes.

Q. Now, you looked at actual cross licenses; right, existing cross licenses in the industry?

A. Yes. That's what's redacted from the table.

Q. And slide 19 that you just presented on direct provides some dollar amounts related to actual licenses; right?

A. That's true.
Q. So your slide 19 list the cross licenses between LCD companies?
A. Well, in particular it shows the balancing payments paid by one of the parties to the other, that's right.
Q. And you identify the parties to those cross licenses in your slide six? Let's look at your slide six.
A. This is not a complete list, but yes, that's right.
Q. These are six of the eight that you looked at; right?
A. Yes.
Q. And you looked at specifically for AUO, AUO's cross licenses with Sharp, with Samsung, with Hitachi; right?
A. Yes.
Q. Now, Dr. Putnam, in each of those

Q. In all of AUO's licenses, AUO has always paid the other party; isn't that right?

A. Among cross licenses within the

A. The ultimate objective is to award damages to those four individual patents, that's true.

Q. So you're trying to predict the value of AUO's claim on its four asserted patents; right?

A. I wouldn't say predict, but yes, I am trying to measure the value, that's right.

Q. And you concluded that if all four of AUO's patents are valid and infringed, then AUO should recover somewhere between $100,000 and $6 million; right?

A. I said that was the most likely range, that's correct.

Q. And that range is based on the four separate estimates you calculated for each of AUO's patents-in-suit?

A. That's right.

Q. So for each of AUO's asserted patents, you calculated a royalty range based on four separate estimates; right?

A. Yes.

Q. You used two, what you called method one estimates and two method two estimates?

A. There is two estimates and then for each estimate there are upper boundaries.

Q. There are two assumptions for each estimate?

A. That's right.

Q. There is the assumption that you think should apply and then there is the top five percent value assumption?

A. That's right.

Q. And that's summarized in AUO Exhibit 1564; right, your estimates?

A. If that's the slide that describes my damages conclusions, then yes.

Q. So let's look at AUO Exhibit 1564. And you calculated as you stated on direct, you calculated ranges of royalties for each patent, you're not offering a specific dollar amount; is that right?

A. Well, it's a very precise range, but you're right, within that range I have no particular preference.

Q. And it may be precise, but it is fairly broad; right?

A. No, actually I disagree. It's within, typically within a few hundred thousand dollars from the top end to the bottom end.

Maybe as much as a couple of million, but you know, that's given the quantity of sales at stake here, that's actually -- particularly relative to LG's claim, it's incredibly precise.

Q. Well, let's be precise. Let's look at where your royalty ranges start for each of AUO's four asserted patents.

For the '629 patent, your royalty range starts at $22,000; isn't that right?

A. Yes.

Q. And if we look at some totals and some averages, we can get I think another sense of your valuation of AUO's claims. This is a slide that summarizes your conclusions providing some totals and some averages. Do you see that? Do you see that slide?

A. I see the slide. I don't understand it yet, but I'm sure you'll explain it to me.

Q. I'll do my best.

If you look at the headings, method one, industry price, and method two, apportionment, those are your method one and

method two approaches; right?
A. Yes.
Q. And then for each of the four patents listed in this slide, I have set forth the four damages estimates that you have provided for each patent. Do you see that?
A. Yes.
Q. So again, we have two method one estimates and two method two estimates; right?
A. Yes, that's right.
Q. And then at the bottom along the total column at the bottom, the total row, I have added the four numbers in each of your four estimates. Do you see that?
A. Yes.
Q. So at the starting point, your first royalty estimate for all four patents in suit, the total is $45,500; correct?
A. Yes, it looks like you have added that correctly.

A. Based on the objective data, that's true.

Q. And so and each of these, method

one and method two ranges, the first number gives the value share for the four patents that you think actually applies; right?

A. That's correct.

Q. And the second number, the second estimate for method one and method two is the top five percent value assumption that you don't think actually applies; right?

A. Well, if one were to disregard the citation data and simply take the parties at their word that these are among the most important patents, then that would apply. So I'm trying to offer alternative ways of summarizing the data citation, data -- the objective indicators. They're limited.

Obviously, the parties attach some weight to these patents, because they've taken -- undertaken the expense to bring them into Court. So I think that's also a factor to consider.

And so I wouldn't say it doesn't -- that it doesn't apply. I would say that it ignores the objective evidence.

Q. And your opinion is that we need

to rely on the objective evidence; right?
That's important, isn't it? Isn't that the reason you used citation rankings?
A. I would say you rely on it, not solely. You rely on it, because it's the best way of ranking all the patents in both parties' portfolio.
Well, which now are over 3000. So it's the best available measure for the exercise at hand.
Given that it may not be perfect, it's important to provide a check on that or, you know, basically ask yourself a question: How wrong can I be? And so if the answer is that we have to throw out that, then we throw it out. And we have -- it's improved.
Q. But using your objective indicator of value, which you think is the most appropriate approach, the real range of value?

A range there. But if you impose that restriction, yes.

Q. And if AUO cannot prove infringement for all four patents, AUO's claim loses value off of those numbers; right?

A. That's true by definition.

Q. And by definition, if any of AUO's asserted claims is invalid, then AUO's claim loses value; correct?

A. I think that's also true by definition.

Q. In fact, your average royalty for the '157 patent, for example, is only $174,250; correct?

Average for that range. But that's a number you've calculated.

Q. And --

A. The more appropriate thing would be to take the average of the low end and the average of the high end, and then pick some number in between.

So that would be the appropriate thing to do. But if you treat them as four independent numbers, then it's the 174,000.

THE COURT: All right. Thank you.

MR. TYLER: I have no further questions, Your Honor.

THE COURT: All right. Thank you, Doctor.

MR. SHULMAN: AUO rests.

THE COURT: All right. Thank you.

MR. BONO: Your Honor, I assume all motions are reserved until post-trial motions?

THE COURT: We'll assume that you would interpose the appropriate motions at this time, and so your position is reserved. And they can become part of the post-trial briefing.

There's no objection?

MR. SHULMAN: No. I was wondering how if you granted the motion, you would take the case away from yourself.

THE COURT: That's what I was thinking.

Okay. Mr. Bono.

MR. BONO: Yes, Your Honor. We're ready to proceed.

We would call Dr. Rubloff as our next -- first witness. Mr. Goodwyn will present the witness.

THE CLERK: Sir, do you want to swear or affirm?

THE COURT: You know, while we're doing this, if we can get Mr. Tyler and Mr. Christenson. Is Dr. Putnam still here?

MR. SHULMAN: Yes, he's here.

THE COURT: Could he just come up to side-bar for a mini -- lawyers that want to come, at least those two -- to conduct a mini examination.

(Beginning of side-bar conference:)

BY THE COURT:

Q. I was going to save this, because I know I'm going to see you again, but I thought I'd ask it now.

A. Sure.

Q. So we have the hypothetical negotiation?

A. Yes.

Q. And we have your model to apply to that negotiation?

A. Yes.

Q. And understanding all the data that you've relied on and the premises of that model, --

A. Yes.

Q. -- in your opinion, why haven't these parties been able to negotiate on the basis of your model?

Let me just expand a little bit --

A. Mm-hmm.

Q. -- away from the patents-in-suit here. But why haven't they been able to negotiate a worldwide license, a cross-license?

A. Well, it's an excellent question,

Your Honor. And, of course, I'm not privy to all their actual negotiations, so I am speaking without full knowledge.

What I can say is that LG's damages claim, the alleged aggregate value of the claim is about $700 million. And so whereas

conclusion and having some appreciation for the cost of patents, you having some appreciation for the cost of patent litigation, is that -- does that cost make any sense to you, as an economist, under any theory that you can conjure up?

A. I understand your question. I think I understand your question. And --

Q. Well, there's a certain cost to engage in this litigation.

A. Yes.

Q. And typically, you know, we'll have patent cases where parties will spend 20, $25 million, but they're going after a $12 billion a year industry.

A. Yes.

Q. Even I understand that. 25 million, 12 billion a year.

A. Right.

Q. I understand. With the numbers here and what we've been hearing in this commercial marketplace, and in this competitive arena, does the typical cost of patent litigation make sense to you, as an economist, in the context of the numbers you're proposing?

A. Yes. I do understand your question.

And it's clearly the case that if you were to award AUO the full damages that I have recommended, AUO would not recover its litigation costs.

And in two weeks when I testify about LG's claim, I expect that LG would not recover its litigation costs based on the damages that I recommended for LG.

Q. So does that kind of push us back into your thought that this might really be about the deflecting competition early on, or does it give us some other lead to another theory that would make sense to you, again as an economist, or a damages expert?

A. I think there are two answers. First of all, it may very well be worthwhile, because Your Honor obviously has the power to injoin an injunction, an incredibly important weapon in a negotiation.

And so often times in litigation, the damages are really a sideshow to the equitable relief that the Court is expected to

award and the parties bargain over that.

The other --

Q. Let's assume here it would be just like cross-licensing. It would be cross-injunctions. So it would put everybody out of business?

A. Yes, that would -- that --

Q. You and I would work in the LCD business.

A. That's right. Well, that's obviously an incentive for both parties to negotiate, if you were to award that.

The other thing I think it's fair to say is that damages award -- well, my opinion, as an economist, is that there's very little science that goes into damages award.

I've spent a lot of my professional life trying to more accurately value patent rights, so that you don't have a situation where somebody can go into Court and ask for the moon and then settle outside of Court for pennies on the dollar.

That's often what you see happening. There's no relationship between what

parties actually pay in the marketplace and what they say in the courtroom.

That's a -- that's a frustration in my business, because I'm privy to the settlement negotiations. I know what parties settle for.

And then I also see what they ask for in the courtroom, which may be a hundred times that. Insofar as the possibility exists that one party can come into this Court and make a very large claim that can -- it may not vary in a relationship to the truth, but there's a chance of a jury, in particular, never having seen these numbers before, a chance of a jury awarding that large number. And that the prospect of that large award influences both the conduct of the litigation and the settlement negotiations.

So while I have done the best that I can to actually measure the value in the marketplace from real transactions about the use of these patents, there's no question that in a courtroom juries have awarded amounts that bear no relationship to those actual transactions.

And if you thought you could get a jury to do that, you might proceed to trial on the chance that you'll win the lottery and receive something that you wouldn't get at the bargaining table.

THE COURT: Okay. It's your witness. Did you have anything you wanted to ask about what I've asked?

MR. TYLER: That's great. I'm fine.

THE COURT: Mr. Christenson?

MR. CHRISTENSON: No questions. Thank you, Your Honor.

(Conclusion of side-bar conference.)

THE CLERK: Please state and spell your full name for the record.

THE WITNESS: Gary Wayne Rubloff. G-A-R-Y, W-A-Y-N-E, R-U-B-L-O-F-F.

GARY WAYNE RUBLOFF, PH.D.,
the deponent herein, having first
been duly sworn on oath, was
examined and testified as follows:

DIRECT EXAMINATION

BY MR. GOODWYN:

Q. Good morning, Dr. Rubloff.

A. Good morning.

Q. Were you asked to form opinions regarding AUO's '629 patent?

A. Yes, sir, I certainly was.

Q. Before we get into explaining your opinions, can you briefly describe your education and work experience?

A. Yes. I took my bachelors, masters and Ph.D. degrees from the University of Chicago in physics. I then did a post-doctoral researcher appointment at Brown University which led me into the area of surface and interface science.

And in the course of the professional experience that I've had, I have published about 200 papers. I've -- let's see, I missed the -- excuse me.

Q. I apologize.

A. I have had twenty patents issued in the areas of electronic materials, manufacturing processes, and testing in

semiconductor technologies. And I'm a fellow in two professional societies.

Q. Can you also explain some of your work experience?

A. Yes. After I finished my post-doc, I went to IBM Research Center in New York for twenty years where I started as a research staff member in the science areas, and gradually got involved looking at IBM semiconductor technology and trying to elucidate some of the important factors in materials and processors for those technologies.

In about 1985, I spent a very special year of my career as technical assistant to the vice-president for logic and memory, who later became IBM's chief scientist. And I emphasize that because it changed my career. It led me into technology areas as you see, I went into management, senior management of silicon technology, and I managed thin film process modeling in the manufacturing research department.

But the perspective that I gained in that, I always say that was the best year of

my career, is that I was able to see many technologies across the spectrum that IBM had at the time.

My job was in substantial part to do the homework of the chief -- of the VP in preparing the ten-year technology outlook for the company which he then presented to corporate management board.

That gave me a chance to see gallium cyanide silicon, optimal electronics, storage displays and other technologies and to work with the directors of all of those divisions. As it happened, it was also my first introduction to LCD technology because I remember very well a tasks force that was going on at that time that I had attended on behalf of my boss to see what IBM's position should be in the new era of opportunity in LCD technology.

In the course of doing all of these things, I did research through this entire time, in fact, I'm still doing plenty of research. I think I was -- it's fair to say i was recognized as a leader in integrated semiconductor processing and equipment

technology, those things which helped one realize what chemical and physical processes can achieve in a technology, and for that I was awarded a well-known prise by the American Vacuum Society.

Q. Were those experiences in semiconductor processing and equipment technology relevant to the manufacturing of liquid crystal displays?

A. Yes, certainly. In particular, the wiring and the thin film transistors that are built in liquid crystal displays are exactly the same processes used in many of those other technologies.

And furthermore, when you look at the equipment industry that supplies those expensive machines that go into those expensive factories, they're the same companies basically making ULSI claims, making LCD displays and the like.

Q. After working at IBM, what did you do?

A. I went to academia where I still am. In particular, I went to North Carolina

State University. I had served on their Industrial Advisory Board and knew the work very well. They were at the time the leading center for research and development in academia of the kinds of technologies needed for semiconductor, particularly silicon devices.

And it was an unusual situation because this is a center sponsored by The National Science Foundation, but in this particular case together with an industry consortium called the Semiconductor Research Corporation.

After that I went to the University of Maryland in 1996 where I have had a number of positions beside my research in teaching. I was director of another engineering research center. I have a title. And five years ago I was asked to start the Nano Technology Center at Maryland, which I did. And I learned last month that I have another director's job to do.

Q. You're still a professor at the University of Maryland today?

A. Yes.

Q. Well, in addition to work within the universities, did you also have any experience with industry?

A. Yes. I have enjoyed that from my IBM days for sure. I have worked as a consultant. I have had research support from a number of companies. They are across the spectrum of kinds of companies involved in this area. And in particular I remember well in 1994 when the industry started its pre-competitive technology roadmap working with that it's called the SIA roadmap at the time, working with one of those groups in metrology. And in particular I remember leading the group on advanced process control which has been a dominant theme in the industry, now it's actually been accepted quite well.

Q. And was much of that research relevant to liquid crystal display manufacturing technologies?

A. Oh, absolutely. One of the things that's -- well, the LCD industry, the storage industry, they all have these consortia for pre-competitor research with the roadmaps and so

on, they use very similar processes in large part, the same companies make the equipment to do that, and so on.

In fact, that was the reason why in 1994, actually, the same time, I started in the professional society, the topical conferences that led to the establishment of a manufacturing and science technology focus group.

Q. You mentioned earlier that you were also involved in research. What type of research were you involved in?

A. Well, that's changed over the years. As I said, I started in fundamental surface and solid state physics and interface science. It migrated increasingly into materials and process science and technology, and that relationship of those processes to each other and to the equipment that's needed to make that happen. And I have enjoyed 25 or $30 million of support from the National Science Foundation, other government agencies in the defense and intelligence industry, private foundations and so on.

Q. Was any of this research relevant to the manufacturing processes for liquid crystal displays?

A. Yes. Certainly. For the parts that create the TFT and wiring networks that are found on LCD displays, it's very relevant.

Q. Have you previously been qualified as an expert in a patent infringement litigation?

A. Yes, I was. A couple of years ago the case between LG and Chunghwa Picture Tubes in California.

Q. What were the patents in that case?

A. I was responsible to opine on the '449 and the '737 patent.

Q. Are those patents directed to manufacturing of liquid crystal displays?

A. Yes.

MR. GOODWYN: Your Honor, I would like to offer Dr. Rubloff as an expert in the field of semiconductor and thin film manufacturing and processes including manufacturing of thin film transistors for

liquid crystal displays.

THE COURT: All right.

MR. SHULMAN: No objection.

THE COURT: All right. He's accepted.

BY MR. GOODWYN:

Q. Now, Dr. Rubloff, you mentioned at the beginning of your testimony that you had formed some opinions regarding the '629 patent. What information did you consider in forming those opinions?

A. Well, there were lots of documents. Of course, the patent itself and its file history. The discussions which accompanied claim construction and the formation of joint claim construction statements. The expert reports, particularly of Dr. Silzars on infringement and validity. The exhibits that were included within those reports. A number of prior art patents and publications. I also considered as relating to the use of pattern density and how one manages it when it becomes a problem. I actually knew about that field and already brought some of those articles to the

fore of my attention from the work I did in advanced process control already.

I looked at many GDS files. These are the mask files that describe the LG Display products.

And I've considered deposition transcripts, including In Duk Songs and Youngwoo Cho. And of course I have listened to the trial.

Q. What are your opinions with respect to infringement and validity of the '629 patent?

A. Well, the first opinion I have is that the accused products of LG Display do not infringe Claim 7 and 16 of the '629 patent.

I say this on the basis of understanding the structure which has been discussed, if not debated here in the courtroom called dummy patterns.

Dummy patterns are used in manufacturing, in specific manufacturing process as a way to deal with the complexity of the structures that you have on the panel. And the way chemical and physical processes come out

once you have these -- some structures in place and attempt to build other ones. So I have been able to consider that. And I have known about that.

I know you've heard that the accused wiring in this case, which Dr. Silzars has talked about is what's called line on glass wiring. And I have found having looked at all of the accused structures in the mask files associated with them, that this LOG wiring is present in all of them, and they are certainly not dummy patterns as described in the '629 patent.

Furthermore, I have tried to make an analysis of the fractional area, the amount of such dummy patterns if we were to make the erroneous assumption that the line on glass patterns are dummy patterns to see if they would reach the thirty percent figure that's specified in the patent and they do not.

Therefore, my conclusion, the accused products do not infringe Claim 7 and 16 that have been asserted.

Q. And do you also have an opinion

with respect to whether the '629 patent is valid?

A. Yes, I certainly do. I believe it is invalid. First of all, the claims are indefinite. I will hope to talk more about that as we go along.

Secondly, the prior art discloses all of the elements of the asserted claims. And finally, on-sale bar, there were LG Display products which if we assume the constructions that have been offered by Dr. Silzars, those products were sold more than a year before the US filing of the '629 and, therefore, constitute an on-sale bar invalidity.

Q. Let's first look at why you believe Claim 7 and 16 are noninfringed. What is your opinion regarding Claim 7?

A. So, Claim 7 is a dependent claim. It depends on Claim 1, the independent claim which is shown here, so this is a listing of the elements of Claim 1. And I have looked at each of these elements and what I find is two things; one, is this first element, a layer of an insulating substrate, having an area, is

indefinite. I would like to speak more about that later.

And secondly, when we look at the dummy conductive patterns statements that are in the final element of Claim 1, the LG products that have been -- have been accused, excuse me, do not have dummy conductive patterns. And structures which are there even if they were dummy conductive patterns do not comprise thirty percent of the area of the insulating substrate. So because Claim 1 is not infringed, I conclude Claim 7 cannot be infringed.

Q. Do you have a similar opinion with respect to Claim 16?

A. Yes, I certainly do. Claim 16 is again a dependent claim, and it's dependent on Claim 9, the independent method claim that corresponds essentially to Claim 1, the independent claim of structure.

So I have marked again the two elements, the forming a layer of insulating substrate, having an area, as indefinite, and then the last element about dummy conductive patterns not being met by the LG products.

Q. When you say the dummy conductive pattern element is not met by the LG products, what are dummy conductive patterns in the context of the '629 patent?

A. Dummy conductive patterns as I said earlier are structures that are put into the design of a product in order to aid a manufacturing step.

And they have nothing to do with the operation of the final product. They are only to help get the manufacturing process to work so that the product can work.

Now, both parties agree that dummy conductive patterns do not convey electrical signals during the operation of the display. So in Trial Exhibit 1074 here, we have the claim term dummy conductive patterns. LG's construction is that portions of the layer that do not receive or convey voltages or signals is what a dummy conductive pattern is.

AUO's is somewhat more restrictive than that, but it's essentially the same, a metal pattern that does not conduct signals or current used in the operation of the display.

So this is a little more restrictive, but the important point here is that both parties agree that if you have a dummy conductive pattern, it cannot convey electrical signals when the display is working.

And I note that this is also supported by other things.

Q. What is your opinion regarding the structure of LG Display's products that AUO has accused of being dummy patterns?

A. They do not involve dummy patterns. The structures which Dr. Silzars has pointed to are line on glass structures which you see here.

Let me take a minute to explain this in some detail because I want to make sure that we make contact with earlier discussion yesterday and with the essence of what's here.

So what you see here is a picture of -- it is an optical micrograph of an LG product denoted as Trial Exhibit 903.

On the right side in the upper portion, you see the gate pads which then fan out to the gate lines in the TFT array that

makes the actual picture. As we move down on the right side to the bottom, what we see is wiring that goes from the pads on the product to TCP, that's -- I have forgotten what that is.

Q. Was it tape carrier package?

A. Thank you, tape carrier package. This piece of plastic which has wiring on it and it goes to where there will be a chip.

Now, the wiring from that chip also extends to the portion here which is toward the center of the structure. And that wiring goes to other pads on the substrate which are shown near the middle of this structure. And these are the pad connections to the line on glass interchip wiring.

Q. Let me try putting on the overhead, perhaps a little bit bigger picture, that might help.

Are these photographs that were included with your expert report?

A. Yes.

Q. I believe this is a portion that you were just discussing up here in the top left-hand corner. And it's continuing down.

What do you see continuing down?

A. So, these are the wiring to the pads for the gate connections. They then go on to the TCP, and to the chip that drives the gate connections.

There are also a set of wires from the chip which come up to -- in this picture -- the left side of the pads at the gate level and then wires extend out from them and these are the line on glass wires.

Q. Let me show one more photograph that was included with your expert report that shows a little bit bigger view.

What is shown now on this display?

A. Well, this is the entire chip that is on the tape carrier package here. So basically the idea is that there are things not shown right in the middle that go to drive the gate lines from the gate driving chip, but there are also wires which come from the chip on to the tape carrier package to additional pads next to the gate pads and then to the line on glass patterns of wiring that allow this chip to communicate with the chip that's down further to

the left, not shown on this drawing.

Q. Is it your understanding that the chip that's shown on the display is necessary for the operation of the display?

A. It sure is. If you pull it off, the display will go dark.

Q. Okay. There's a demonstrative to your left that shows a printout of a mask file. Can you show us on the demonstrative where these photographs would correspond to?

A. Yes. They are upside down. Please understand we have to think that way.

So what we have here, this is the edge of the TFT display panel. These are the pads that I alluded to on the left, center and right.

The wiring, which I was talking about, the line-on-glass wiring comes from a side software that are in the circuit boards. Wires turning the corner here. They then go out through some of the pads with the line-on-glass wiring to the TCP to a chip.

Here that chip now has the information necessary to give the right signal

to the gate pads here that drive all of these rows that are going to be on this display. And the chip will send other information to the line-on-glass patterns through an additional set of pads here, that then go through the line-on-glass wiring to the next chip.

Send the information through the line-on-glass pads here to the next chip. The next chip drives these lines that fan out here like this, and sends the -- the information back to -- back here onto the -- onto the panel to more line-on-glass wiring that goes to the next chip and so on.

This is a blow-up. In the middle portion here showing the line-on-glass pads here, that would connect, as I said, to the chip. And then funnel that information down these structures to pads that communicate with the next chip.

MR. GOODWYN: Your Honor, may I approach the witness?

THE COURT: You may.

BY MR. GOODWYN:

Q. Dr. Rubloff, I'm going to hand you

a panel from a LCD product manufactured by LG Display, and I wonder if you could just very briefly explain, using the panel, the line-on-glass approach you just discussed?

A. Yes. So to keep it -- may I stand? Is that okay?

THE COURT: Yes.

THE WITNESS: So to keep it in the same orientation as you see here, the display communicates with the outside world here through printed circuit boards to give information to the -- to the source lines here, which are driven by the source driver chips here.

The technology advance that happened here, wouldn't it be nice if I didn't have this? Well, we used to have that up here.

Now, what we have is just these little tape.

Carrier packages with chips on them here. And they get the information, not by this rudimentary way of doing it, but by having signals, line-on-glass signals that go through the glass here, go over to the corner, turn the corner here, then go on to take care of your

package. Excuse me if I use some more interesting language.

Talk to the chip. Tell the chip here what signals to send out to the gate lines in this region.

Then those -- that information, and power and other things are communicated back onto the glass, the line-on-glass wiring. Then out here to the next chip, back over and so on.

Q. Dr. Rubloff, did you review LG Display's mask files -- I'll take this from you.

Did you review LG Display's mask files to determine whether or not all of the accused products use this line-on-glass technology?

A. Yes. I looked at every one of the -- at the mask files for every one of the accused products.

Q. And are the -- put up on the board -- I'd ask you to look at your binder that you have with you. There's a tab with 46 numbered tabs.

If you could look at the first one, and the first page of the first one.

A. Yes.

Q. There's a printout from a mask file. Is this the printout from the mask file in your notebook?

A. Yes.

Q. Okay. Now, how do you know that this uses line-on-glass technology?

A. Well, right here what we see are gate pads that go to the fan out for the gate structures. And next to it we see a number of pads here that would then be communicating through the tape carrier package to a chip.

And it shows a number of structures here. And if I follow on the mask file, these structures, for example, this heavy one here that goes this way or this one here that goes this way, these guys go a long distance to the left, and then come back in a fairly symmetrical pattern to what we see here near the location of the next chip.

Q. Now, if we zoom in on one of those pictures, which I believe is probably the third picture in your binder, you see some text, VOG, VVV, GOE.

Did you add those labels?

A. No. The mask file, the GDS file that gives a complete design of this structure has the different, for example, the red layer, for gate metal, the different layers of material that are patterned on this structure, but it also includes layers that are really there to annotate the design.

And so this layer is a separate layer in the mask file that you can turn on and off in various kinds of viewers we have for dealing with GDS software. And so this is simply there because I turned on that layer, so it would print.

Incidentally, these displays are so complicated, the designers need these kinds of annotations to keep track of where they are.

Q. Okay. Just before those numbered tabs, there's a list that's three pages long that identifies each of the mask files associated with the 46 tabs.

Does this document reflect the names of the mask files that you reviewed with respect to your noninfringement analysis of the

'629 patent?

A. Yes. I didn't memorize all 46, but they look just about right.

MR. GOODWYN: Your Honor, I'd like to move into evidence the list of mask files that Dr. Rubloff reviewed, and it's from LGD Trial Exhibit 380.

MR. SHULMAN: No objection.

THE COURT: It's admitted.

BY MR. GOODWYN:

Q. Now, Dr. Silzars -- first, you said you were present in the courtroom when Dr. Silzars testified; is that right?

A. Yes, I was.

Q. Now, Dr. Silzars had testified about line-on-glass being necessary for etching and to protect those outermost lines in the fan out. Do you agree?

A. No, I do not agree.

Q. Why?

A. Actually, in my deposition testimony, I talked about the pattern dependency that sometimes is an issue for manufacturability. And one of the things that I

said was that these pattern dependencies are known.

We try -- when we're developing a product or a technology, we try to first develop the rudiments of that so that we can make some devices working, and so that we know what are the next set of problems to address.

Because by the time you get to a product this complex, there may be many such challenges. So we don't -- we know that pattern dependency can happen.

But we only address it when we start to see where there's evidence for it. And there is no evidence that's been presented nor that I have seen of a pattern dependency in any of these LOG structures. In fact, there's evidence to the contrary.

Q. What evidence to the contrary are you discussing?

A. Well, one thing is the testimony of In Duk Song from LG who said they had analyzed this. They had never seen a problem that is that one described in the specification of the '629 patent.

The second is that yesterday we saw a mask file where those LOG structures were not present during the time of etching. So that's a very nice experiment to test whether there is a problem such as that highlighted in the specification of the '629.

Q. Is the mask file you just mentioned on the display now that's been marked as LG Display Trial Exhibit 1080?

A. Yes, it is.

Q. How do you know there aren't any patterns present during the etching of the fan outs of the gate metal?

A. From a number of things. First of all, I note we saw this zoomed up yesterday.

But the gate layer is the red layer here. I happen to remember what they are and I know these colors by now.

The blue is a silicon layer. The source drain layer is the kind of pink-purple layer and so on.

And so when this structure was made, the blue layer was not present. These are little blue dots actually.

And they were not present when the etching of the gate metal layer, which is in red was actually done. So here's the case where there was no metal in the region where the line-on-glass wiring of gate metal is present in the accused LG products.

Q. Would this figure that's now on display, which just shows the gate metal layer, show the structures that would be present during the etching of the gate metal layer?

A. Absolutely.

MR. SHULMAN: Could we just identify what it is we're looking at?

MR. GOODWYN: Sure.

MR. SHULMAN: The record is going to be a mess.

MR. GOODWYN: I identified it as LG Display Trial Exhibit 1080.

MR. SHULMAN: Production numbers.

MR. GOODWYN: They're printouts from a mask file, which I think I read out yesterday, which is NBPC_P2_10.41 -- or excuse me, 10.4_ SVGA_G005.gds.

MR. SHULMAN: Thank you.

Q. Now, I apologize, Dr. Rubloff. Did I interrupt your testimony?

A. Well, let's see. I think your question was you said that this is a printout, which shows only the gate layer. And so you can see that there is -- there are pads here that could have been used in this product for line-on-glass wiring, but there is no such here.

We don't see these structures that -- if I may now refer to this big poster here. We don't see these structures, those accused by Dr. Silzars in the product. Yet this product has been sold successfully, I understand. And I think that's a very good evidence that there was no problem here --

Q. Okay.

A. -- with the etching described in the specification.

Q. Well, in addition to the fact that, in your opinion, LG Display's products don't have dummy conductive patterns, you also

mentioned that they don't meet the limitation related to the 30 percent of an area.

What is your understanding of the meaning of that in the claim in the context of the '629 patent?

A. So I made a slide for that. Thank you.

So what's important in interpreting the last element of Claim 1, and I guess it was Claim 9 is to understand how would we interpret area to evaluate a 30 percent limitation. Thirty percent is always enumerator over a denominator.

Now, the claim term that we start with is a layer of insulating substrates having an area. My belief is that this is indefinite because there are many layers on these substrates. And there's another part of the claim which says forming a layer, and we know this technology is all -- all about forming a layer.

And once we have these layers, they have different pieces to them. So there could be many different areas.

So that's the basis on which I think this is indefinite. I do believe that the best interpretation and construction for this claim term, and I want to adopt some term -- some construction in order to make an analysis of infringement, is that offered by LG Display, which is material deposited and patterned on substrate, such as glass, that covers part of the array substrate surface.

We didn't get any help from AUO on what this claim term means. I guess that means that they don't agree it's indefinite.

The word area is certainly indefinite, and so I've interpreted it in this way. I would have to say that AUO's construction didn't help me either by giving just a synonym.

Q. Okay. Well, did you prepare a demonstrative that helps you to explain what that construction means?

A. Yes. I hope it's the next slide.

Yes. Thank you.

So Claim 1 talks about a layer of an insulating substrate, having an area. And

Claim 9 is about forming it.

So we start with the glass substrate. That's what all these technologies begin with.

Then we deposit the gate metal layer or the first layer on the substrate which would be patterned. And then next we pattern that structure to form pads for bringing signals into the gate lines and then fan outs of those signals to the gate lines that stretch across the substrate.

And so this area that we see from the left where you see they're kind of really larger things to the right and all the way across the panel is where the picture would appear on the display that we're looking at.

The dummy patterns in the '629 patent are specified to be situated between the connection pads, which are these dark -- two dark things at the left hand of this picture and the pixel electrodes, which is everything in the picture part of the display.

And so I've colored in yellow the region where the dummy patterns would have to

exist. I should note that I've gone a little too much towards the front with the element. It should go from the foremost gate line to the rearmost gate line.

Q. Okay. Now, what is your opinion regarding AUO's infringement claims related to the claim limitation dummy conductive patterns comprising about 30 percent of the area?

A. Well, I'm sorry. If you'll just leave that -- if you'll leave that up then.

Q. Okay.

A. If there were to be dummy conductive patterns, they have to be in the region specified by yellow. And so in evaluating the percentage, I will take the area of the dummy conductive patterns and divide by the area of the entire layer, because I think that's the appropriate way to look at the definitions that are here, and the final element of Claim 1.

Q. When you say total layer, are you referring to the total layer on the substrate or the total layer occupied by the metal?

A. Just by the metal. There's an

important physical reason for thinking this way.

We build the gate line structures by the thousand or so to be able to run this display, and the dummy patterns would be there to improve manufacturability, if needed, of those gate line patterns.

So a measure of how much has been needed from dummy patterns is to relate what's been added to the things which need to be there already.

Q. Okay. Now, with respect to the specific 30-percent limitation, did you form an opinion?

A. Yes. Under this algorithm for figuring out what the percent would be, the LOG wiring in the products is certainly less than 30 percent of the gate metal layer.

Q. And what if you were to interpret it differently?

A. Well, I thought of other kinds of interpretations because of the indefiniteness problems with this pattern. And another one I thought about is, well, suppose the LOG wiring were to be dummy patterns.

I'm sorry. That's the assumption in both of these cases. If we were to assume the LOG wiring were a dummy pattern, which it's not, what fraction would it comprise of the portion which was essentially the yellow part?

And I did that calculation. So if the LOG wiring here were a dummy pattern, what fraction of the yellow area, essentially would that be? And that's under that.

Q. Can you turn and point to the demonstrative of the full mask file of one of the accused LG Display's products of the area you considered?

A. So, yes. So the gate pads are this region, this region and this region.

The fan out of those -- to the lines comprising -- this is kind of -- I hope we can see triangular region, triangular region, triangular region.

And the portion that the line on glass wiring going from this end to here and then from here to here and from here to here is shaped like this, the portion of that. That starts at the -- at -- the end of the pads

closest to the TFT array would be included in that configuration.

Q. Now, in addition to forming an opinion with respect to noninfringement, did you also form an opinion with respect to the validity of the '629 patent?

A. Yes, I did.

Q. In addition to your invalidity discussions that you've just had, did you also review prior art?

A. Yes, I did.

Q. Did you review a reference that I'll refer to as the Hirabayashi '695 or EP '695?

A. Yes.

Q. Is this that reference?

A. That's the reference.

Q. Did you form an opinion as to whether or not EP '695 anticipates the asserted claims?

A. Yes, I did the evaluation this way. I looked at each and every claim in the '629 patent, which was asserted.

And I looked at the reference that

you see here, the '695 and asked if each and every claim element in the asserted claims could be found in this patent. And the answer was yes.

Therefore, this patent, by itself, anticipates the '629 patent.

Q. Can you show us where in the EP '695 patent each of the limitations are disclosed?

A. Sure. So I'd like to start with the independent Claim 1, which I believe -- which I've reproduced here. And there are some pictures and references that I've put on the right-hand side of this slide.

So the preamble is an array substrate for display, of course. And then the first three elements of that claim, a layer of an insulating substrate, a -- having an area.

A thin film transistor array on top of it and plurality of wiring. I'm sorry. Just the first two of those are found in EP '695 Column 31, Lines 16 to 23.

Then a plurality of wiring, in the next element, arranged on the insulating

substrate, that can be found in Figure 4 of the EP '695 patent as I've shown here, these are the various pads and pixel regions and so on.

The next element of the claim, connection pads, can be found in -- along with pixel electrodes in Figure 1, and designated by the yellow highlighted pieces, the numbers of which I'm sorry, I cannot read. But they are there, and I have looked at them a number of times, including last night.

And finally, the dummy conductive patterns element is here. The last one of Claim 1. And the evidence for that in the EP '695 is found in column 19 lines 49 to 54.

Q. This is Claim 1. Did you also find sufficient disclosure with respect to asserted Claim 7?

A. Yes, I did.

Q. And can you explain to us how all the limitations of Claim 7 are disclosed in EP '695?

A. Well, I just talked about Claim 1, and now let's talk about what's needed to get to Claim 7. Claim 7 is dependent on Claim 4 which

is dependent on Claim 2 which is dependent on Claim 1.

So Claim 2 talks about a dual metal structure, and Claim 4 talks about the selection of the upper layer of wiring from the molybdenum and a number of other refractory metals, and the evidence from that comes from EP '695 column 16, lines 19 to 28.

And then the Claim 7 talks about the upper layer wiring material not becoming insoluble in an acid or alkaline etchant, and I tell you that titanium nitrate does not become insoluble in an acid or alkaline etchant.

Therefore, all of the elements of Claim 7, 4, 2 and 1 are found in EP '695, and, therefore, this claim is invalid as anticipated.

Q. Did you do a similar review for asserted Claim 16?

A. Yes, I did.

Q. Can you briefly explain that to us?

A. Yes, I'll make it very brief. It's essentially the same argument. This is the method claim and there is one extra element in

the sequence of dependent claims needed to get to 16, and that is Claim 11 which is the group of aluminum and aluminum alloys, and that's also found in exactly the same reference, column 16, lines 19 to 28.

Q. In addition to the EP '695, did you also review a reference, Watanabe 275?

A. Yes.

Q. Is this the reference shown on the display now?

A. Yes.

Q. Did you form an opinion as to whether this reference anticipates or renders obvious the claims of the '629 patent?

A. Yes, I believe that Watanabe 275, this reference, together with other references would render the '629 patent invalid for obviousness reasons.

Q. Can you step us through your analysis, please?

A. Yes. So let's start with Claim 1 again. We're a little lucky here that the reference in the '275 patent, column three, lines 37 to 49 has essentially all of the

components, all of the elements of Claim 1.

Q. What about the dependent claims?

A. Of the dependent claims, including Claim 2, which requires a dual layer metal structure that is missing from Watanabe 275, and if one were to have that, one would likely have also Claims 4 and 7, but let me go through that.

'275 does not disclose a double layer gate metal wiring. But the '275 patent does mention the metals that might be used, as molybdenum, aluminum, chrome and so on, so it gives us a hint where we might go.

The '430 patent, which is another prior art patent, discloses a two-layer structure of molybdenum, that's column four, 39 through 55 in Exhibit 315.

The '629 patent --

Q. Before you go on, the '430 patent, can I have that up there, please. Is what's shown on the board the '430 patent, the patent that you're referring to?

A. Yes, that's Kubota.

Q. Kubota?

A. Yes, that's it.

Q. And that's identified as LG Display Trial Exhibit 315.

A. Okay. Continuing on, the '629 patent admits that the dual layer structure was known in the art, so there would be other references for that as well.

Therefore, it would have been obvious to form a dual layer wiring as described in the '430 and the '629. And so the dual layer with molybdenum on top will inherently not become insoluble in acid or alkaline solution.

So if we take Watanabe 275 together with other references, I would judge that Claim 7 is obvious and therefore invalid.

Q. I believe you indicated earlier that all of the elements of Claim 1 are disclosed in Watanabe; is that correct?

A. Yes.

Q. And the one thing that's missing is the double layer gate metal wire layer?

A. Yes.

Q. '629 and Kubota both disclose a double wiring structure?

A. Yes, that's true.

Q. Did you also do a similar analysis with respect to Claim 16?
A. Yes. So Claim 16 is a dependent claim, depending on the method Claim 9. And exactly the same reference that was '275 patent column three, lines 37 to 49, has all of the elements of Claim 9 in it.
Q. Okay. And the dependent claims?
A. And the dependent claims work essentially the same way. As I mentioned, there is one little difference which is aluminum which is Claim 11, but that's also found in these references.
Q. Now, you also mentioned an on sale bar, and in your expert report, you had identified a couple of products manufactured by LG Display, the LT060V1 and the LT071V1. Do you have an opinion as to whether or not the products manufactured by LG Display, those products would anticipate or render the claims invalid or an on sale bar?
A. Yes, they would.
Q. Did you look at those mask files?
A. Yes.

Q. For the record I would like to show you a portion of a mask file printout from a mask file C7160VA01.GDS with a cell 60LAY_PNL_$49, is what's shown on the display

MR. SHULMAN: Could we have a copy.

MR. BONO: Your Honor, would you like a copy of the binder for these exhibits?

THE COURT: You can pass it to the clerk.

BY MR. GOODWYN:

Q. I think my question was, Dr. Rubloff, do you see a difference between this mask file and the one you saw earlier with respect to the dots?

A. Yes. You'll note that the dots are a different color, they are red in this case. And what that tells us is that those dots

were patterned into the gate metal layer when the gate lines are made as well.

Q. So if we look at just the gate layer, which is another -- it's just only layer six from the same printout; is that right?

A. Yes. So you see the dots here, you see the gate fan out region here to go to the gate lines and so on.

Q. And in accordance with the testimony that Dr. Silzars had, would those be dummy conductive patterns?

A. Yes, under his interpretation and construction, these would be dummy patterns. Notice that they exist between the inner edge of the gate pads and the TFT display. They are not connected to any wiring. And so they would function as dummy pads.

He also made comments about regular structures which is exactly what you see here that could be divided in any number of ways. So there could be -- he would potentially give many different ways of drawing the dummy structures here.

Q. Well, do you know what material

was used in forming the gate lines for this product?

A. Yes. That's the dual layer, aluminum neodynium on the bottom, molybdenum on the top.

Q. What is the basis for that understanding?

A. That's been testified by an LG engineer, Youngwoo --

Q. In Duk Song?

A. He may have said it, but there was another one.

Q. Youngwoo Cho?

A. Thank you.

Q. And do you have an understanding of when this product was made and sold in the US?

A. Yes, I do.

Q. What's the basis -- first of all, what is that understanding?

A. The understanding is that this product was sold in the 1999-2000 time frame into the United States.

Q. At what point in time? I'm sorry,

you said '99. What was the basis for your time frame?

A. Oh, yes. I had a discussion with In Duk Song in Korea to make sure I understood the time frame for the sales of these, and I had another discussion with an LG representative who was here, who I think you will hear from later. He showed me the sales data and the invoice data for these products, and they were in the time frame well before the sale bar.

Q. Is there any information in the mask file itself that would give you an indication of the date of the mask file?

A. Yes. These mask files as I said have a number of different kind of annotations and, of course, one of them is a time stamp or a date stamp. So in the program which I used to analyze the GDS file, there is tools, and then you pick time stamp and you see what the date of that is. And it says 1998.

Q. 1998.

Well, I would like to show you a mask file for the other product that you mentioned in your expert report. And it comes

from the same mask file, C7160VAO1.GDS, but has

A. I actually don't remember if that's the difference, but maybe.

Q. Okay.

MR. GOODWYN: Your Honor, I would like to move in evidence the printouts from the mask files for the products LT060V1 and LT071V1 that come from the file C7160VA01.GDS, and are a part of LG Display Trial Exhibit 380.

Shown in the mask files that we just went through if you apply Dr. Silzars' definition.

A. Absolutely.

Q. Would the same be the case for Claim 16?

A. Yes.

Q. Dr. Rubloff, if I could just ask you to very briefly summarize your opinions with respect to the '629 patent?

A. My opinion is that the accused products do not infringe any claim of the '629 patent. And that the '629 patent is invalid for three reasons; it's indefinite, it's invalid over prior art, and because of on-sale bar.

MR. GOODWYN: Thank you, Dr. Rubloff. No more questions, Your Honor.

THE COURT: All right. We'll recess for lunch for forty-five minutes. We'll come back at about 1:35.

(A luncheon recess was taken.)

THE COURT: All right. Be seated, please.

MR. CHRISTENSON: Your Honor, before we proceed with Dr. Rubloff's testimony, I just wanted to respectfully request that some of the exhibits that were offered in during Dr. Putnam's testimony be submitted under seal

because they contain confidential information of third parties and pursuant to your rulings yesterday, my understanding is to protect the interest of those parties, you would allow us those materials to be submitted under seal, specifically this would be the license agreements and patent agreements that are summarized in AUO Exhibit 1563, and there was also I think it was Exhibit 273 which was Putnam Exhibit 13 to his report. All of those documents contain highly sensitive confidential third-party information and we respectfully ask that they be admitted under seal.

MR. TYLER: No objection, Your Honor.

THE COURT: They'll be submitted under seal without objection.

MR. GOODWYN: Your Honor, one more quick housekeeping matter. With respect to the documents that Dr. Rubloff referred to during his direct examination, there is an LGD Trial Exhibit 1082, and I would like to move or offer into evidence the exhibit and all the documents identified there.

MR. SHULMAN: We'll have to look at it, but --

THE COURT: We'll admit it subject to any objection you may have.

MR. SHULMAN: Very well.

THE COURT: Ready to proceed?

MR. SHULMAN: Yes.

CROSS-EXAMINATION.

BY MR. SHULMAN:

Q. Dr. Rubloff, you and I have not met before; correct?

A. I think that's right.

Q. Okay. My name is Ron Shulman and I have some questions for you regarding the '629 patent.

Now, you understand, sir, that at this trial, AUO is asserting Claims 7 and 16 of that patent against LG; correct?

A. Yes.

Q. Okay. And Claim 7 and 16 are dependent claims; correct?

A. Yes.

Q. Okay. And Claim 7 depends indirectly from independent Claim 1 and 16 does

likewise from Claim 9; correct?
A. Yes.
Q. Now, let's look at independent Claim 1 on the screen. You agree that Claim 1 is directed to "an array substrate for display"?
A. Yes, that's what it says.
Q. And the first element of Claim 1, that first subparagraph calls for a layer of an insulating substrate having an area, do you see that?
A. Yes, I see that.
Q. And the insulating substrate refers to a piece of suitable insulating material such as glass, for example; correct?
A. Okay.
Q. Is that right?
A. The insulating substrate, yes.
Q. Okay. And that insulating material such as a piece of glass is said to have, "an area," according to the claim; correct?
A. That's what it says.
Q. And Claim 9 says the same thing; right?

A. Yeah, forming that.

Q. And in your personal opinion, the meaning of the term, "an area," as recited in Claims 1 and 9, is, "insolubly ambiguous"; correct?

A. That's right.

Q. Okay. Now, let's look at the third element of Claim 1. And this element calls for a plurality of wiring arranged on the insulating substrate with each wiring having a first end, et cetera, et cetera. Correct?

A. Yes, that's what it says.

Q. Okay. And once again, in your personal opinion, the meaning of the term "each wiring", as recited in Claim 1, also is, "insolubly ambiguous"; correct?

A. I think that's what I said in the report.

Q. Well, let me remind you. Could we have his invalidity report, Section G on page 77, please.

And you stated here on page 77 of your invalidity report that specifically, "It is my opinion that the terms 'area', 'each wiring',

and 'the dummy patterns' comprising at least about 30 percent of the area of the insulating substrate, as recited in Claims 1 and 9 are insolubly ambiguous."

That was your opinion; right?

A. Yes. What I meant by that was that there was no clear distinction on the proper interpretation of those terms. And that's the reason why I spent significant effort trying to imagine what is the most reasonable definition of those terms --

Q. Okay. But you --

A. -- in order to understand the patent.

Q. Your personal opinion was that they're insolubly ambiguous; right?

A. Correct. What I meant --

Q. I'm going to get to what you meant in a moment. What you said in your report is these terms are quite insolubly ambiguous; right?

A. That's what I said.

Q. Okay. Now, the adverb insolubly means incapable of being explained; correct?

A. Where does that come from?

Q. Well, let's pull up a dictionary. Can we have the dictionary definition of insoluble?

It has two definitions. One of which has to do with dissolving salt in water and that's not applicable here; right?

A. Right.

Q. Okay. And the second definition is incapable of being solved or explained. That's what insolubly means in this context; correct?

A. Well, that's what the dictionary says.

Q. Well, you speak English; right?

A. Certainly do.

Q. And you were using insolubly as people who speak English use the word insolubly?

A. I used insolubly to mean that is -- cannot be done ambiguously. And I did not look in the dictionary to look up that term.

I used it in the sense that I normally would have in dealing with an issue where there is ambiguity.

Q. Okay. And what you said is insoluble. Insoluble, the amplifier is such that it can't be such?

A. You're reading it with my use of the word what you think I meant by the word.

Q. Well --

A. I'm telling you what I mean.

Q. Okay. So you use the word in a way that the dictionary doesn't define; is that your testimony?

A. I'm sorry. The dictionary doesn't have all the nuances of context or use of words, and I certainly don't look up every word in the dictionary before I use it.

Q. Okay. But you do use it?

A. I'm sure other people don't either.

Q. Could you explain to the Court exactly what you meant by insoluble?

A. What I meant by insoluble was that there is ambiguity in the terms that I use this expression for. And despite my efforts and discussions with whoever I might choose to discuss this with and whatever references I

might take, I will never have a strong degree of confidence. No. That is uniquely the right explanation for those terms that I labeled as indefinite.

Q. Okay. So, in your opinion, there is no definite meaning of these terms; correct?

A. The terms are indefinite.

Q. Okay.

A. Yes.

Q. And if you don't definitely know what these terms mean, then would you agree that you're also incapable of telling this Court whether these terms that have no meaning to you exist in the accused products and in the prior art?

A. Absolutely not.

Q. Okay. Let's move on.

Is it correct, sir, that as explained in the '629 patent, the problem the patent addresses is known as undercutting that can occur during the wet etching process?

A. Well, that's part of the description. It's really talking about the use of wet etching as you etch through a layer,

reach another layer at which two different mounts or different work functions create what's sometimes called a battery effect that can cause a change in the etching characteristics.

Q. So what I said is not correct?

MR. GOODWYN: Objection. Your Honor, if counsel would allow the witness to complete his answer.

MR. SHULMAN: I'm sorry. I thought he was done.

THE WITNESS: I'm sorry. The last -- where was I?

BY MR. SHULMAN:

Q. I'll just ask the question again. Is it correct that your opinion, sir, as explained in the '629 patent, the problem that the patent addresses is known as undercutting that can occur during the wet etching process?

A. Undercutting is a part of the phenomenon described in the specification. It is not described in the claims.

Q. Okay.

A. The claims are very broad in this patent. The motivation is to look at issues of

etching in dual layer structures and undercutting and the relationship to specific structures in the vicinity. That is the focus of much of the discussions in the specification.

Q. Very good. Let's look at your opening report at Page 16, please.

You did write that, "As explained in the '629 patent, Column 2, Lines 56 to 63, the problem addressed is the development of an undercut." You did say that; right?

A. As I see it, that's not the end of the sentence.

Q. We're getting to the next part. But you did say that; right?

Yes?

A. Yes.

Q. Okay. And the undercutting refers to the fact that during the wet etching process of double layer wiring structures, the lower layer of metal is etched underneath the top layer of metal; correct?

A. Well, are you quoting the next sentence?

Q. Just tell me whether it's correct

and then we'll look at the rest of the sentence?

A. That's a part of it.

Q. Okay. Let's look at the rest of the sentence.

As explained in the '629 patent, the problem addressed is development of an undercut or where the aluminum surface is etched underneath the top metal. That's true; right?

A. Yes.

Q. Okay. And undercutting of double layer wires during wet etching is a problem, because it can reduce manufacturing yield by causing electrical shorts; true?

A. Electrical shorts. May be other things as well.

Q. Okay. Now, according to the '629 patent, this undercutting problem can occur due to a phenomenon known as passivity of the top layer of the metal wire; correct?

A. I think that's what it says.

Q. And passivity means that the top layer of metal becomes insoluble in the acid or alkaline solution used as the etchant; correct?

A. Reduced etching.

Q. Pardon?
A. Reduced etching, right.
Q. Okay. So, well let's look at what the patent says. '629, Column 5, 13 to 17.
In the present invention, the term passivity is referred to as a phenomenon that metal such as molybdenum or a metal allow such as a -- the M word alloy becomes insoluble in an acid or alkaline etchant. That's what the patent says; right?
A. Mm-hmm.
Q. And when the top layer of metal becomes insoluble in the etchant, but the bottom layer does not, you can get this etching underneath that is referred to as the undercutting problem; correct?
A. Yes, that's -- that's the mechanism by which you would worry about the shape, the mouse hole, the overhang and so on.
Q. Right. Now, is it true, sir, that there are many different metals that can be used to form the top layer of a wire to be etched?
A. I think there are a number. Sure.
Q. Yeah. And some examples are given

in the patent, for example; right?

A. Okay.

Q. And let's look at Column 4 and 5 of the patent. In there, they -- the inventors identify molybdenum, chromium, tantalum, titanium, and other alloys are some of the suitable metals that can be used for the top layer of the wire; right?

A. Yes.

Q. And is it true, sir, that there are many different or several different wet etchants that can be used to etch both the top and bottom metal layers of the wire?

A. Yes, with different results possibly.

Q. Right. And according to the '629 patent, these different wet etchants would include both acidic solutions as well as alkaline solutions; right?

A. You know where that reference is?

Q. Yeah. Let's look at the -- on the screen '629, Column 5, Lines 13 to 17. You see that it says you can use either acid or an alkaline etchant; right?

A. Well, this is talking about what causes passivity, not what acid or alkaline you can use to do the etching.

Q. Well, it's talking about the insolubility of a metal in the etchant and it says the etchant can either be acidic or alkaline; right?

A. Right. I thought your question had to do with whether you can use acids or alkalines to do etching at various points in the patent.

Q. Right. It says the etchant that leads to the solubility problem, sometimes is an acid or sometimes is an alkaline; right?

A. Well, this is not really prescribing what the etchant is.

Q. Okay. Well, let's move on. It's not important.

A. This is making the assumption that there's an acid or an alkaline that's used to do etching. And in some cases, there may be a passivation that develops during that process.

Q. Okay. And the inventors provided you some examples of different kinds of acidic

etchants that can be used in the patent; right?

A. I think that's right, but you probably can put it on the screen for me.

Q. Sure. Columns 6, Lines 34 to 37.

A. Yes.

Q. And it says --

A. That is an example.

Q. Phosphoric acid, nitric acid, other kinds of acid mixtures, whatever; right?

A. Yes, you can use those.

Q. Now, let's return to this passivity problem that we spoke about earlier. One way of solving the problem, according to the patent, is to select an appropriate metal for the top layer and an appropriate etchant such that the metal of the top layer doesn't become insoluble in the etchant; right?

A. Would you be more specific about the configuration that you're talking about?

Q. Talking about a double layer piece of metal where the problem could arise. I'm saying that passivity problem, the patent says that one way of solving that problem, just one of the ways of solving it is to select an

appropriate metal for the top layer and an appropriate etchant, such that you don't get this insolubility of the top layer in that etchant?

A. That would be one way you'd try to make this work, yes.

Q. Right. And the solution to that problem is the subject matter addressed in dependent Claims 7 and 16; right?

Let's look at Claim 7 and 16 on the screen to save you the trouble. And what they both say is that the upper layer of the wiring material must be selected such that the upper layer does not become insoluble in the chosen acid or alkaline etchant; right?

A. Well, you may remember that I said a few minutes ago that the application to dual layer metal etchants is described in this patent in the specification as a motivation for thinking about, I guess, what the very broad claim should be. There is nothing in these claims which specifies whether the solubility in acid or alkaline is done in the configuration of the dual layer.

It's --

Q. This is dependent from claims above it, and we all looked at it. You told us earlier that the claim above it requires a dual layer; right?

And, of course, this claim itself says upper layer, which means there's a bottom layer; right?

A. I don't read it that way.

Q. You think the upper layer means the upper layer of a single layer wire?

A. I think that the material for the upper layer is said here to be chosen, so that it will not become insoluble in an acid or an alkaline.

So that -- so that --

Q. I'm sorry.

A. So that means --

Q. Go ahead.

A. I take a vessel with the acid or the alkaline in it. I take a piece of that metal and I see if it etches or instead doesn't etch.

Q. Does the upper layer in this claim

refer to the upper layer of a two-layer wire where a wire consists of metal on the top and metal on the bottom?

A. The words upper layer wiring material here refer to the material that will be used for the upper layer.

Q. Right.

A. But the spec -- the description of the result, whether it would be etched fast, slow, whatever or relatively slowly to be called, let's say, insoluble, is only a property of the material.

Q. Okay. So is it true, sir, that in Claim 7 and 16, these both require that the upper layer of wiring material must be selected such that the upper layer material does not become insoluble in the chosen etchant?

A. Yes. I think under --

Q. Okay.

A. -- normal conditions. Right.

Q. Now, you agreed that it is certainly true that a number of factors can have an effect on the solubility of a particular set of materials used in a multilayer structure;

right?

A. Yes. There are many factors.

Q. One of those factors is the temperature at which the etching takes place; right?

A. Can be temperature. Can be many things.

Q. Right. Another factor is the identity of the particular etchant or mixture of etchants being used; right?

A. Yes.

Q. Another factor is the concentration of the etchant on mixture of etchants; correct?

A. Yes.

Q. And there are probably lots of other factors that I haven't listed; right?

A. I'd be glad to list some.

Q. That's all right. But there are others; right?

A. Yes.

Q. Now, in your expert report on validity, the first prior art reference you discuss appears at Page 20 of your report, which

is on the screen now.

If we could blow up the Section A there. And that's the European '695 patent that you spoke about on direct; right?

A. That's right.

Q. Now, let's look at pages 28 and 29 of your expert report. And in this paragraph that bridges pages 28 and 29, this contains your entire discussion of the validity of Claims 7 and 16 in light of the European patent; correct?

A. I don't remember if I had more paragraphs than that.

Q. I would be happy to show you your report if you would like to confirm it.

Turn to page 28 down at the bottom, there is a paragraph that is under the heading six, and it's a single paragraph that spans 28 and 29.

A. So, I'm sorry.

Q. So is it correct that your entire discussion of the validity of Claim 7 and 16 in light of the European '695 patent is contained in this paragraph that bridges pages 28 and 29 of your validity report?

A. You're asking me if that one paragraph is everything that I had about validity for?

Q. Claims 7 and 16 in light of the '695 patent?

A. Well, it appears that that's all that I put into the discussion.

Q. And is it correct in this paragraph you never state that the '695 patent mentions the passivity problem?

A. Well, the passivity problem is not mentioned in the claims of the '629.

Q. I didn't ask that. Would you please confine yourself to my question.

A. I'm sorry. So your question is?

Q. You never mentioned the passivity problem in this paragraph that bridges pages 28 and 29; correct?

A. But my understanding of --

Q. Sir, can you answer my question, yes or no?

MR. GOODWYN: Objection, Your Honor. Again, counsel is interrupting the witness from trying to answer the question.

THE COURT: I believe he's asking for a yes or no and then you can explain. Can you answer the question yes or no and then explain.

Q. Do you ever state in this paragraph that bridges pages 28 and 29 that the '695 patent mentions the passivity problem?

A. It doesn't mention the passivity problem, I explicitly -- and the reason for that --

Q. I didn't ask for the reason. We have limited time here. If your counsel wants to ask you about that on redirect?

A. I need to explain what my answer means.

MR. SHULMAN: Your Honor.

THE COURT: A short explanation.

THE WITNESS: My answer is that I was addressing invalidity here. That is a comparison as I said earlier between what's in the '629 claims and the elements in those claims, and what's in the prior art. And in the claims, it does not talk about the etchant problem.

Q. Now, in this paragraph you also never state that the '695 patent mentions a solution to the passivity problem; correct?

A. Yes, it's the same situation I just told you.

Q. So the answer is no, you never mention it; right?

A. It was not necessary to mention it.

Q. I didn't ask that, sir. Do you mention it, yes or no?

A. No, because it was not necessary.

Q. Now, and you also never state that the '695 patent ever mentions selecting an appropriate metal and etchant to avoid the passivity problem; correct?

A. As I read the title --

Q. Can you answer my question and then provide the explanation?

A. The answer to your question is no. And the title of this paragraph is what I was trying to address, which is the invalidity of these claims. These claims do not mention the things that you're raising.

Q. Now, depending upon the numerous factors that we have gone over that, etchant that we went over a few minutes ago, if you use the metal etchants disclosed in the '695 patent, you may or may not encounter the passivity problem; correct?

A. Well, that covers it if you say may or may not.

Q. Right. Very good.

Now, the next prior art reference you discuss in your report is the '275 patent which appears at page 29 of your report, which is on the screen. Do you see that down at the bottom?

A. Yes.

Q. And is it true that the '275 patent no where teaches that the upper layer of a two-layer wiring structure does not become insoluble in an acid or alkaline etchant?

A. Yes, I think I explained that the shortcoming of the '275 for anticipation is it's a single-layer structure.

Q. Is it true that quote, the '275 patent no where teaches that the upper layer of

a two-layer wiring structure does not become insoluble in an acid or alkaline etchant, yes or no?

A. I'm sorry, where are you reading?

Q. From the question that I just wrote on the piece of paper before we got to court.

A. Please say it again.

Q. Is it true that you, sir, have written that the '275 patent no where teaches that the upper layer of a two-layer wiring structure does not become insoluble in an acid or alkaline etchant?

A. The question is -- I'm sorry, you're speaking very fast. I'm trying to digest the words correctly.

Q. Let's look at your report, page 40, sections six, lines five through seven. Can we have that on the screen.

Did you write that quote, the '275 patent does not teach that a multilayer wiring structure of that, the upper layer does not become insoluble in acid or alkaline etchant, did you write that?

A. I certainly wrote that.

Q. The third reference that you discuss in your expert report is the '069 patent which you did not refer to today; correct?

A. That's correct.

Q. So let's not talk about that one.

The next patent that you referred to in your expert report was the Japanese patent publication ending in '415, and we didn't hear about that today, either, did we?

A. That's correct.

Q. So let's skip that one.

And the fifth prior art reference that you discussed in your report was another Japanese publication that ended in '811, and you said nothing about that today; right?

A. That's correct.

Q. Okay. Now, if you would look, please, at your expert report at page 76. If we could have that on the screen, Bill, his expert report at page 76.

And down at the bottom of the bottom half of that page there is a Section F that continues for six lines on the next page or

five lines on to the next page where you set forth your entire discussion of these two LG products that you testified about on your direct, namely the LT06OV1 and the LT071V1; correct?

A. Yes.

Q. Okay. And that's the entirety of your discussion on these two products in your expert report; correct?

A. Yes.

Q. Okay. And what you said here if I understood you correctly is that if AUO's infringement analysis at least with respect to these two products is correct, then in my opinion, the '629 patent would be invalid because of the on sale bar; right?

A. That's right.

Q. Okay. Now, let me hand you AUO Exhibit 1539, which is a list of all of the products accused of infringement by AUO in this case with respect to the '629 patent.

And is it correct, if you could just briefly look through it and look for the designation LT that identifies the product

names, and will you confirm for me that LT, whatever number, doesn't appear in this document?

A. That's in the model number column?

MR. SHULMAN: May I approach, Your Honor?

THE COURT: Yes, you may.

THE WITNESS: Is that what you mean, right here?

Q. Correct. In fact, I can help you out and move this along a little bit. Where is the other one? On the first page of this document, they're all LP numbers; right?

A. No, I'm going fast here.

Q. Okay. Take your time.

A. (Witness reviewing document.) So your question is whether I --

Q. Did you find any LT?

A. And the answer is no.

Q. So the LT products that form the basis for your on sale defense were never accused of infringement according to this exhibit; right?

A. Well --

Q. Is that correct?
A. This is a chart that I have not prepared.
Q. Can you answer my question rather than the one you choose to answer. I said according to this exhibit, LT products were not charged with infringement; right?
A. I think that's right.
Q. Okay. Thank you.
Now, during your direct testimony, you were shown -- can we have the Elmo, Bill.
You were shown LGD Trial Exhibit 380, which was in one of your -- towards the back of your binder that you had on direct. Do you recall that? It's the second to last tab in your book.
A. Yes.
Q. I'm not going to ask you details about this, but just to refresh your recollection, you were asked about this document. Do you recall that?
A. Yes.
Q. Okay. And then the next tab in your book is another excerpt from LGD 380 and

you were asked some questions about that, too; right?

A. Yes.

Q. Okay. And is it correct, sir, and these relate to the so-called LT060V1 and the LT071V1 products; correct?

A. Yes.

In this paragraph, or two paragraphs that bridges pages 76 and 77 of your expert report; correct.

A. You said page --

Q. Turn to page 76 of your validity report where you discuss these two on sale products.

A. (Witness complying.) Yes, I'm there.

Q. And in the section that bridges pages 76 and 77, Section F, you never refer to either of these two documents in your discussion of those products; correct?

A. Yes, that's correct.

Q. And you offered no opinions about those two drawings in your expert report?

A. Well, I think in my expert report I said that I looked at all kinds of --

Q. Can you answer my question and I didn't finish it, so give me the courtesy of letting me finish my question.

A. Excuse me.

Q. Is it correct that you offered no opinion about either of these two drawings on pages 76 or 77 of your report, yes or no?

A. I don't know whether it was yes or no. I did not explicitly mention these, that's what you're after.

Q. During your direct testimony in reference to these two documents, you said something to the effect that the metal wires there were two-layer wires; right?

A. Yes.

Q. Okay. And you were asked that question at your deposition, and you said I don't know; right?

A. I don't remember it.

Q. Let's look. Can I have the Elmo,

please.

This is from page 422 of your deposition transcript taken in April; right?

A. I think so.

Q. Okay.

"QUESTION: Do you know how many layers the wiring of either of these two products -- that's a poor question. How many layers are in the wiring of either of these two products; do you know?"

I represent to you, sir, they were talking about the two products we are talking about here.

"ANSWER: I don't. I would have to look. For that, I would have to look at the masked files and probably look at the QC charts and the QE charts."

That was your testimony; right?

A. That was my testimony.

Q. And the QC charts and the QE charts are not referred to in this passage that bridges pages 76 and 77; right?

A. Correct.

Q. And neither are the mask files;

right?

A. Correct.

Q. You also testified on your direct that you made an area calculation with respect to these two so-called on sale products; right?

A. I don't remember that.

Q. You said it anticipates, so you must have made that 30 percent calculation; right?

A. Well, I looked at ways that I understood at that time AUO to be defining area and percent area, which is certainly now been made much more clear by what we've heard yesterday.

Q. So the answer is you did make a calculation; right?

A. I looked at a number of calculations that might be the way to look at this, that's right.

Q. So in your opinion in order to tell the Judge that it anticipated, you had to conclude based upon some calculation that you made that 30 percent was occupied by these dummy patterns; right?

A. That's correct.

Q. Now, your deposition was taken as we see here on May 2nd, 2009; right?

A. Yes.

Q. Roughly a month ago; right?

A. Yes.

Q. And at that point, a month before the trial began, you were asked, "So, have you contemplated a percent coverage?"

And I represent to you once again, this is about the same two products.

"ANSWER: No, I couldn't. I probably thought about it, but the '629 doesn't give a prescription for calculating the percent coverage that is in the claims. So as I said, the patent is indefinite."

That was your testimony; right?

A. That was my testimony.

Q. And today you're giving us a percentage?

A. I'm giving you a percentage today because it's become increasingly clear what the interpretation of area and percent area is by AUO and Dr. Silzars --

Q. And you provided us no prior knowledge of that opinion before today; right?

MR. GOODWYN: Objection, Your Honor. Again, counsel was interrupting the witness and not letting him finish his answer.

Q. I apologize. Go ahead.

A. I was attempting to explain how clear it became first from Dr. Silzars' deposition testimony, and then his testimony yesterday, what the various things that AUO's documents had been converging to as a position with regard to area and percent area.

Now it is absolutely crystal clear, and so my statement in the direct today came from all of those recent factors that have emerged, his deposition testimony, the way he drew the different patterns on the '629 figures, and the discussion that we all heard yesterday.

Q. Okay. Now --

A. And excuse me, that's the basis for my statement now.

Q. Okay. Now, one of the slides you were shown earlier on your direct examination was this one, Trial Exhibit 1074; right?

A. Yes.

Q. And this has to do with constructions concerning this area limitation; right?

A. Yes.

Q. Okay. And up at the top or in the middle, rather, is LG's proposed construction, which says what it says. On the right is AUO's proposed construction which is plain meaning. And then down at the bottom, the indefinite, that's your personal opinion; right?

A. It certainly was my personal opinion.

Q. And the one above is LG's position, not your personal opinion, your personal opinion is it's indefinite; right?

A. No, that's not what it says.

Q. Your personal opinion is that it's indefinite?

A. My personal opinion is that the use of the term area is indefinite, and that means that there is a great deal of ambiguity in a layer of insulating substrate having an area which I believe is resolved by my own opinion

and by LG Display's construction as you see it there.

Q. Let's look at the next slide, which was shown, it's LGD629015. And you used this to explain how LG's products don't infringe. Do you recall that?

Area and said that's where the dummy pattern should be located; right.

A. Yes, that's taught in the '629.

Q. And you -- if I understood you correctly, you said LG's products don't infringe because the --

A. Would you like a laser pointer?

Q. No, I'm even worse with those.

But the area where the -- the metal that occupies the area where the dummy pattern should be has to be at least 30 percent of all of the metal on the substrate; right?

A. Yes, the dummy pattern area, if there is some, within what's essentially the

yellow region would have to be 30 percent of all the metal that's seen.

Q. And so -- and you concluded that based upon that understanding of the claim, LG's products don't satisfy that 30 percent limitation; right?

A. That's correct.

Q. Okay. And you used the same claim construction undoubtedly when you analyzed the prior art; right?

A. Let me go through this. No, I think it's different in the following sense --

Q. It is different; right?

A. Please let me explain.

Q. Well, let's first establish it was a different claim construction you used when analyzing the prior art; right?

A. The prior --

Q. Yes or no first.

A. I have to think about the odds of how that's supposed to be, because it's not the right question.

Q. Let me see if I can help you. Okay.

Take it a little bit quicker. Let's turn to your prior art slide. Here's one of them.

This is slide LGD 629-019. And down towards the bottom there, you show in yellow in something labeled Figure 1 the dummy pattern area; right?

A. Yes.

Q. Okay. And what you don't show is how much metal occupies the rest of the substrate; right?

A. Well, I can estimate what it is.

Q. You didn't. And you have no way of knowing that what's shown in yellow is 30 percent or more of all of the other metal that exists on the substrate; right?

A. Well, I think the back of the envelope calculation, that would show that quite clearly.

Q. Which you did not offer; right?

A. No. I didn't have time to offer.

Back of the envelope calculation would say the pixel array is transparent, for the most part. Therefore, the amount of metal

will not be that much or you wouldn't be able to see light through it.

Q. But you never made that measurement, because there's not enough information in that prior art to make the measurement; right?

A. I -- I accept that.

Q. Very good.

Now, let's see what you did here. This is Slide 23, LGD 629-023. And this concerns the other prior art reference, the '275; right?

Yes?

A. Yes.

Q. And Figure 2 of the patent is what you used to illustrate the so-called dummy patterns; right?

A. Yes.

Q. Now, what you colored in yellow are the dummy patterns; right? Or what you call the dummy patterns; right?

A. No, what I colored in yellow was the structure. The light -- it's the light shielding structure that was added there. And a

fraction that the triangle at the top would be the dummy pattern according to '629.

Q. Okay so the dummy pattern is just this triangular top of the yellow piece of object that's on the screen?

A. Yes.

Q. Okay. And once again, you don't show the total metal occupied on the substrate; right?

A. No.

Q. So you didn't make that 30 percent calculation; right?

A. No. I can make that 30 percent calculation if I assume Dr. Silzars' definition of area, because that's a blanket area.

Q. No. I want you to use the claim construction that you used for purposes of infringement.

MR. GOODWYN: Objection. Your Honor, counsel is repeatedly interrupting this witness and not letting him finish his answer. He's not getting the answer he perhaps wants.

I'd just ask that the witness be permitted to give a full response to the

questions that he's asked.

BY MR. SHULMAN:

Q. Let me repeat the question. Using LG's construction, which you use for purposes of infringement, denying infringement, is it correct that you cannot make the 30-percent calculation based upon the information contained in Figure 2 of Slide LGD 629-023?

A. It would be difficult to make a calculation based on LG's construction in this case, but not difficult on AUO's construction.

Q. But you've got to use the same construction, whether it's infringement or invalidity, and you didn't; right?

A. Well, wait a minute. This is a situation, as I understand, the -- I think you know I'm not an attorney.

This is a situation where there are multiple constructions before the Court, and they have not been resolved. And I thought the issue was that my responsibility is to interpret each prior art reference, each accused product reference, and so on on the basis of the various constructions that are on the table.

Q. Okay. Finally, let's look at LGD 1080, which was also shown to you on your direct examination. Correct?

A. Yes.

Q. Okay. I don't expect you to read your whole report.

But I've looked through your whole report and I found no -- on invalidity, and I found -- strike that.

MR. SHULMAN: Excuse me for one second, Your Honor. Sorry for the interruption.

BY MR. SHULMAN:

Q. This document LGD Trial Exhibit 1080, you discussed when explaining your reasons that LGD doesn't infringe; correct?

A. Yes.

Q. Okay. And I don't expect you to read through your infringement report right now, because it's lengthy.

But I'll represent to you that I looked through your infringement report and I couldn't find any reference to this exhibit in there.

A. Well, excuse me. I don't think I

said that quite right.

In terms of infringement, what this shows is one simple fact that the product didn't have an etchant problem. This doesn't relate to dummy patterns. There are no dummy patterns in this one.

Q. So this is --

A. In the gate metal.

Q. Sorry for interrupting. I keep doing that.

Are you finished?

A. So I don't recall that this was directly addressing the infringement in my report.

Q. So Exhibit 1080 is not relevant to your infringement opinion?

A. No, that's not true. The discussion of the patent, the merits of the patent, et cetera, has to take into account, I believe, the specification, which is the technical description of the -- of this etchant phenomenon and also the specification of the claim.

And as I said earlier, these are

very different in this patent. The claims are extremely broad.

What this information in this slide shows is that there was no problem with undercutting with etching with any mouse holes, whatever you want to call it, because this product didn't have that problem.

So it relates in the specification of the patent. I'd have to think harder to think whether that has any implication to the infringement.

MR. SHULMAN: Thank you very much. I have no further questions.

MR. GOODWYN: Your Honor, I just have one quick question for Dr. Rubloff.

REDIRECT EXAMINATION

BY MR. GOODWYN:

Q. Dr. Rubloff, you included as an Exhibit 3 to your invalidity report a list of all the materials you considered. Do you remember right?

A. Yes.

Q. And it was an extensive list?

A. I think I remember it. Yes.

Q. And in that list, you also included a list of the mask files that you reviewed?

A. I think I must have. That's in the binder?

Q. I don't believe it's in your binder.

A. Okay. Go ahead.

I'm sorry. Go ahead.

MR. GOODWYN: Excuse me one second. I apologize.

BY MR. GOODWYN:

Q. And this was one of the pages in Exhibit 3 to your expert report that identifies the mask files that you reviewed?

A. Oh, yes.

Q. Do you see that? Do you see Number 76 on this spreadsheet?

A. Yes.

Q. Is that the mask file related to the two --

A. On-sale bar products.

Q. -- on-sale bar products?

A. Absolutely. I remember the 7160

especially now. But, yes, that's the mask file.

MR. GOODWYN: Okay. Thank you. No more questions.

THE COURT: Doctor, you may step down.

THE WITNESS: Thank you.

MR. BONO: We call Mr. David Eccles to the stand.

THE CLERK: Please state and spell your name for the record.

THE WITNESS: David Albert Eccles. D-A-V-I-D A-L-B-E-R-T E-C-C-L-E-S.

THE CLERK: Okay. Do you prefer to swear or affirm?

THE WITNESS: Swear.

THE CLERK: Do you solemnly swear that the testimony you're about to give to the Court in the case now pending will be the truth, the whole truth and nothing but the truth so help you God?

THE WITNESS: Yes.

THE CLERK: Thank you.

DIRECT EXAMINATION

BY MR. GOODWYN:

Q. Good afternoon, Mr. Eccles.

A. Good afternoon.

Q. Are you here to testify regarding your opinions about the '160 patent?

A. Yes, I am.

Q. Before we begin going over the '160 patent and your opinions, could you briefly describe your education, experience and work experience?

A. I received a bachelor's degree in electrical engineering from the University of California at Irvine, and studied signal processing.

I did post-graduate work at Perdue University. Then I went to work at Hughes Aircraft Company as a design engineer designing display circuits. And I also led projects doing display designs and investigations.

This is where I first became familiar with liquid crystal display technology. In approximately 1979, I worked on my first liquid crystal display and started to understand the effects of this, the slow response time of the liquid crystal; and therefore, the need for

driving it harder or what's been called later overdrive.

So I had experience with that doing -- also doing photometric measurements, and human factor studies and display performance. In 1987, I joined Sony, worked there for about 17 years in doing design of the world's first 2000 line computer monitor used for air traffic control and helped develop that. Worked on the video circuit and video processing as well as photo metric measurements on that.

And I also led a project to develop the world's first microprocessor controlled software controlled multi-scan computer monitor for sale in the market in the world.

And I also the engineer in charge of manufacturing to build the monitors and introduced some automated camera equipment that would measure and adjust the monitors. And in about 1994, I was asked to take over and develop a TV design group to design Sony's television products for North and South America.

So I recruited and built up a

group to do that, which ended up making, designing the products for sale in America by Sony, and which was about three and a half million TV products a year. And we developed all the different engineering expertise that was needed and product design procedures.

In 2004, I left to start doing independent consulting. My first job was working with the company that had a video processing technology, so I helped them develop a product, and test that out, and show how it would improve the dynamic contrast of high definition TVs, including, of course, liquid crystal flat panels.

And I've worked for various companies since then, all in display technology developing new display products and evaluating them.

Q. When you mentioned for a couple of different experiences, I think both with Hughes and Sony, that you had experience with photometric measurements. What are photometric measurements?

A. Photometric measurements are the

way you characterize displays. It's important to characterize them in a way that the eye sees them.

There's various ways to measure energy coming from a display. But one way, in particular, is, of course, to measure it as the eye sees, what colors the eye sees. And there's various tests that are run to do that.

But it's very important to set up the procedures properly so that you can duplicate and get repeatable results. That's important for -- often in the case of air traffic control, we have to get procedures approved and then sell off the products that -- because of the safety issue.

Also, and just for TVs or selling products to other companies, you have to meet certain specifications.

Q. Well, in addition to your work experience, do you have any other experiences within the industry, for example, related to displays?

A. I've been a member of the Society for Information Display, and I've served on

committees that evaluate papers and display design, a signal processing display performance for at least 20 years.

I was also vice president of that organization. It's the largest organization in the world in display technology.

I was a Board member of the Video Electronic Standards Association who sets the standards for inputs, for instance, digital inputs to monitors and video processing, and of course, a member of IEEE.

I have published some papers, and I've been invited internationally to teach seminars on liquid crystal display product design which has to do with the electronics, the signal processing, back lights and the performance and study of artifacts that come out based on the different video processing.

Q. Do you have some specific experience relevant to the technology described in the '160 patent?

A. Well, I think there's three particular areas of my background that in my 30 years as a display engineer that are

particularly interesting.

For instance, video signal processing design, both as an engineer and as a leader for the groups. The -- due to the processing of the video throughout the system. I wouldn't say I was an expert on technology of the liquid crystal, for instance, like we've heard about here today.

But I have had extensive experience on how to drive the liquid crystals and what results come out.

And so you asked me about the photometric measurements, that was a large part of that process is to accurately measure and characterize the results of the displays.

And then, finally, because of my experience and my understanding of the importance of the display product that's actually in TV, that was the most important aspect. So I recruited and set up a group in Sony to which was a visual performance group.

We created source material to evaluate displays and TVs and evaluated those displays, measured them, observed them and came

up with criteria so that those TVs would be acceptable for sale into the market.

MR. GOODWYN: Your Honor, at this point, I'd like to offer Mr. Eccles as an expert in the area of driving in optics for displays, including liquid crystal displays.

MR. SHULMAN: No objection.

THE COURT: He'll be admitted.

BY MR. GOODWYN:

Q. Mr. Eccles, you mentioned earlier that you had formed an opinion with respect to the '160 patent. Did you form an opinion with respect to infringement of the '160 patent?

A. Yes, I did.

Q. Could you explain to me what that opinion is? I'll put up Claim 1 on the board if that helps you.

A. As far as Claim 1, looking at the limitations of the claim, I determined that LG does not have a storage for storing the previous brightness level which we can explain later. They do not have a determinator for determining an output brightness level based on the previous brightness level for the same reason as the

previous one.

And first of all I believe the term substantially equal is indefinite, it's difficult to understand just from the patent language. But even with respect to that, I think there is prior art that also would meet that, so I don't see how that LG could possibly infringe upon that, either.

Q. Well, let's take the first one. If you could just briefly explain what your opinion is with respect to why LG Display doesn't have a storage for storing the previous brightness level in its accused products?

A. I have looked through each of the specifications of the timing controllers and they all have what's called compression feed forward driving so the previous brightness level is the data is compressed, it's stored as ones or zeros and some other average, or informational data, then it's decompressed and brought back to do a comparison and so, therefore, the storage doesn't actually store the previous brightness levels.

Q. And the determinator for

determining an output brightness level based on the previous brightness level stored in storage, can you briefly explain why you believe LG Display's accused products don't meet that limitation?

A. Well, it refers to the previous one where it talks about the -- based on the previous brightness level, so LG does not use the previous brightness level to do the comparison. But that one also ties in with the next one which talks about substantially equal.

LG in my reading of the LG procedures and their timing controller, they measure a response time, and they optimize 10 to 90 percent rise and fall time, and by using a probe that measures some absolute energy of the waveform. And they don't actually measure any quantity of light, nor do they calculate what the ideal quantity of light would be to match.

Q. Well, with respect to time integration quantity and substantially equal, I know we have seen this a number of times over the last couple of days with Dr. Silzars, but have you provided a quick explanation of what

the patent describes as the ideal quantity of light and the time integration?

A. Yes, I have.

Q. Can you please explain it to me?

A. Well, simply in '160 patent first of all talks about ideal quantity of light. So if we draw a waveform during the -- you can see here outlined in red, and the area S is under the curve of the red signal, so this is one frame here, the ideal response would be that it turns on and then turns off. And that's all the light that you get. So the patent defines the ideal quantity of light as S, versus as we could measure instantaneously the brightness as we go along here, but when you add the whole area here, then you get the ideal quantity which the '160 patent refers to.

Q. When you say the ideal quantity of light or the brightness, is that the amount of light the human eye perceives?

A. That's exactly what the '160 patents talks about and that's the reason for their proposed novelty is to -- that we'll be able to match the amount of light that the eye

sees.

Q. Can you explain to me what the time integration quantity of light is?

A. If we go next, if we look at this lower waveform, the S, the actual response of light from the liquid crystal will not go instantaneously. In this way back in the '160 patent it looks like the rise time was 30 milliseconds or so. So the waveform will go up, but at the end of the frame when the signal goes back to off it will drop down.

So the integration quantity of the actual waveform or the actual light output is this area under the green. This will also be integrated by the eye and the idea is to have this green area match the area under the S, but in this case it's smaller.

Q. And how do you have the green area be the same as S?

A. Well, on the next, if you overdrive, meaning instead of driving to level one you actually put in the input to drive to level two, this is what's commonly known in the industry as overdrive. Since the I think late

'80s, at least early '90s, it's been commonly referred to as overdrive.

You overdrive the pixel with a slow response time. The light here you can see under S double prime still doesn't get up to the level two, but it at least gets to level one in this diagram and other types of drives it will get higher, other types of liquid crystals.

Now, as you see in the frame when it's turned off, the fall time here and there is a little bit larger area, so in this case the '160 patent, this symbol here, the S double prime is about equal to S and this is the idea of the patent is to make these areas equal and they'll look the same to the eye.

Q. Now, is the ideal quantity of light measured during a single frame in accordance with the '160 patent?

A. Absolutely, it's measured. It's defined here as on, or from off it goes to on and then off, and it's during that one frame.

Q. With respect to the time integration quantity of light, it includes both the rising and the falling?

A. That's absolutely necessary for the '160 scheme is that you include the falling time, because obviously the light during the first frame is not going to ever be equal to the light that's by the area S, so you include the falling time then you can get close to that ideal quantity of light.

Q. Is there any relationship between the time integration quantity of light and the amount of light that the eye perceives?

A. Well, that's the idea here is that the time integration quantity is what the eye sees, as long as that's not a small enough area, one or two pixels, then the eye perceives that time integration quantity. And the goal of the '160 is to have that matched the same as the ideal quantity of light.

Q. That would be the total amount of light the eye sees?

A. That's the total amount of light, yes.

Q. Now, is there any description in the '160 patent itself about the time integration quantity of light?

A. Yes, it describes it.

Q. What does it describe?

A. Well, at least it attempts to describe it. Time integration quantity taken from the '160 patent, which is a change in brightness in the moving-state video signal integrated with respect to time, it says the moving-state brightness used for storing the relation is the brightness when the particular pixel changes back to the off state one frame after it is driven from the off state to the on state, that's a little backwards, confusing. What they're saying is they go from off to on to off, so that's what it describes here.

And then it mentions, this is in accordance with the passage of a wire frame model over the particular pixel, and then the brightness in the moving state which is used when the relation is stored is the quantity of light equal to the brightness change integrated with respect to time.

So this invention obviously was done for CAD models which was a big problem at this time with the slow response of liquid

crystals, when you moved an image on the CAD screen, the vertical lines -- if you move it horizontally the vertical lines would disappear or blink and come back when you stopped. It also caused a problem when you rotated in 3D which you often did with CAD, so all directions did that. So this problem is being addressed by this patent.

So also mentioned in here, moving video images, but in my opinion, that was probably an afterthought. Because there is not really sufficient information and descriptions in here that would address that. In fact, it creates some problems.

Q. Well, moving video images, for example, won't always be from off to on to off; isn't that right?

A. That's hardly ever the case. They're usually from different gray shades to gray shades.

Q. What do you mean from different gray shades to gray shades, or gray level to gray level?

A. Rather than going from zero

brightness to full brightness, let's use an eight bit DAC, we'll talk about level zero is off or black and level 255 is full white. So usually those actual levels don't occur on video signals, they're say go from 50 to 100 and then goes to 200, so they jump around because video is so full of different information.

Q. Does the '160 patent explain how to determine a time integration quantity of light for that type of a situation?

A. Well, I think that's where it's unclear. I made a drawing to show the importance of that, to see that. Here is a case where we're going from L1 to L2 back to L1 with the ideal quantity. So you can see in red if we then decide to overdrive that to level three, we're going to get -- the response time is going to go up to level three, and then fall back down.

So in this case, the time integration quantity would be the area shown in green here which is the area under this curve. Then this is the case where it goes from the previous level to another level back to the

previous because we read in the text it defined going from off to on to off, it wasn't so specific or specific at all about gray levels, so one interpretation could be just go back to the level you started at.

Q. Would there be a different result if you went back to zero?

A. If you go, you do what the text says and go back to off. I have shown an illustration here. Then there would be a different amount of area, you would need to drive it higher to L4 -- if we could show the next picture -- to get the fall time to go back down. This is the light that you would measure under just the green here and, therefore, you would have to calculate a higher overdrive level to load the lookup tables for the patent.

So whether you pick the previous state or an off state for the frame two would make a difference, there is a different area and you would have to have a different drive level. So that's why I think the '160 was not so specific about video. It's pretty clear about wire frame, off to on to off, but it's subject

to interpretation or experimentation to do gray to gray levels.

Q. Is it important to know whether you go either back to the previous level or back to zero in determining the appropriate overdrive level?

A. To determine the overdrive in accordance with the '160 patent it's absolutely essential because as you can see, I have shown here, you might determine level three is appropriate or level four. This determination has to be made first before you can make measurements to load the lookup table.

Q. Did you review Dr. Silzars' testing methodology and measurements?

A. Yes, I did.

Q. Do you have any opinions about his methodology?

A. Well, I see a number of errors, so I'm very hesitant to believe the data. As I mentioned, I have had extensive experience in photometric measurements. I think there is a basic process that's usually followed. First you do a setup and design of experiments, then

you would identify procedures. And if it's important, an issue for like a company or to sell off a product, you would write out the procedures identifying the equipment and actually have them approved by a quality engineer. I would do that at a company so that you know the procedures are right.

You, of course, need to calibrate the equipment so that you know both that your results are accurate and what the tolerance in that accuracy is. You would take the data, you would do the analysis as outlined in the procedure and then finally you would calculate an experimental error when you're done. You the often do measurements and get three digits. Certainly photometric measurements are not accurate to three digits. You need to know what the experimental error is, depending on the test either plus ten percent or minus ten percent might be quite good, sometimes it might be worse.

So I guess first of all, you asked me about the measurements, I had concerns. First of all, I don't see the evidence of those

steps in the procedure done. And one of the glaring ones is the calibration of the instrument.

I recently read in Dr. Silzars's deposition that he said he used a linear photodiode.

Q. Is there a problem with using a linear photodiode?

A. A linear photodiode is not what the eye sees. And I believe the '160 patent is ideal quantity of light and what the eye sees. A linear photodiode measures radiometric measurements. It measures the energy and where the photometric measurements are done if they want to measure what the eye sees with what's called a photometer or an instrument, it could be the same photodiode, but it's calibrated to a photooptic curve, what your eye sees.

So the problem is if you look at these waveforms, these are collected with the photodiode. If you use a photometric instrument, then your eye is less sensitive at the lower light levels, so actually this is -- these numbers would be a little bit lower at the

lower light and then your eye is more sensitive at the higher light levels, so the shape of this curve would be changed somewhat.

So that's a fundamental problem in that I believe the numbers that I see in the results using the photodiode are not depicting what the eye sees, therefore, the calculations and measurements I don't see how that can be related to the ideal quantity of light.

Q. You also mentioned that you reviewed Dr. Silzars' deposition testimony. Did you review anything in his testimony about disabling an ODC function during his testing?

A. Well, he made measurements with and without overdrive enabled, yes, and that's in his report.

Q. Did he also -- was there a feature in -- in the backlight that directed -- that would actually change the amount of light provided based on the picture and whether or not he enabled or disabled that?

A. What you're a talking about is the DCR function, the dynamic contrast ratio, and he mentioned in his deposition, I believe in his

testimony as well that he disabled that. And the function of the DCR is to adjust the backlight brightness according to the level of brightness on the screen. And that's to make dark scenes darker and bright screens brighter. That's appealing for TV signals. It wouldn't be used for a CAD system, but it's appealing for TV.

If you disable that, it's difficult to get measurements because we are not sure what the actual display would show when it's sold into the market. And so I think that's another reason that the numbers would be different if they had been left like the product is when it's sold.

Q. Well, with respect to the ideal quantity of light, were there any problems in your opinion with respect to Dr. Silzars' calculations in his testing?

A. Once the measurements were made, which I explained I have doubts about the accuracy of those, there were also some problems I see with the calculation method according to the definitions in the '160 patent.

Q. What are those issues?

A. Well, here is the actual images from Dr. Silzars' report, and on the left, we can see this is where the block is, what he calculated as the ideal quantity of light going from L1 to L2. The actual ideal -- actual quantity of light during frame one as you can see on the right, I have included the hatched area at the bottom. This is because light is light, the eye sees it, and when you turn it on to a level two, that's the amount and then you have a perfect response. That's the amount of light that will be seen during frame one, from zero to L2, that's actually what you see. So this quantity on the left is I think maybe a mathematical quantity, but it is not the ideal quantity of light.

Q. What about Dr. Silzars' calculations for the time integration quantity of light?

A. I should point out that the levels here recorded are going from 50 to 225. That's why I mention it does not start at zero. I'm not sure if this level is zero in his

measurements, but wherever zero is, it was not included.

So if you -- the next slide or the next button push will show when you have a response time, this is actual measured response time, the same kind of calculation was done by doctor -- in Dr. Silzars' test results where actually what the eye sees would be what is outlined here that has additional areas, so once again, the amount of area is different, you get a different number in the calculation.

Q. When you say it's a different number, would it be significantly different?

A. Well, as you can see here, I'm not sure if this is to scale, but yes, it's going to be different, both of them are different numbers, so it's hard to take this data, especially in light of I don't believe the numbers are actually correct in the first place, it's hard to say and compare those.

But if you took different conditions like one from 150 to 200, those would be vastly different. So I think here you can add more area so it's kind of going to make the

ratios closer together I guess if I had to predict, but I couldn't come up with a number.

Q. Well, in addition to the calculation for the time integration quantity and the ideal quantity of light for when overdrive was enabled, were there any other issues that you had with respect to Dr. Silzars' approach to testing?

A. Yes, there is one more issue. You can see here. The input level is level one, then it went up to level two, then the input went back to level one again. However, as you can see, if you push the button on the right -- go back, I think we missed -- this is with overdrive enabled. So what happens is you go from level one to level two, but as you can see, barely see and you heard Dr. Silzars explain in his testimony that the level during frame two that was applied to the liquid crystal itself was a different level than what the input was.

He, of course, applied the input again, level one, but in this case you can see that the overdrive was enabled. Therefore, the waveform would go down a little bit below the

original level.

So in summary, I mentioned that the '160 patent was not clear to go back to level one or back to zero, he did neither of those, he went to a different level, whichever the lookup table in the product supplied.

Q. If you're trying to measure the time integration quantity of light, what's actually being omitted from a display, is the level into the TCON or the level that's provided to the pixel the relevant number?

A. Well, the relevant level is what level it's going to occur on the display, which is related to the voltage that's supplied to the liquid crystal. I think the point here is I heard Dr. Silzars talk about super position. Super position means, for instance, you could measure one frame and measure the results during the fall time according to the '160, then you could do another frame and do it, then you could add the results together.

This would make it really impossible to separate out and find what the actual ratios should be by driving it to a

different level after. So clearly in the '160 patent it doesn't even talk about using an overdrive level for the second frame.

Q. Did you create a demonstrative to explain that issue?

A. Yes, I did.

Q. Okay. I believe that's on the screen now. Can you explain or does this --

A. So -- so, first of all, here's what was actually supplied to the liquid crystal, and therefore, the resulting output brightness on the left and Dr. Silzars' testing.

So I -- as I mentioned on the upper right, you could go, and if -- you could push the button. You could do -- continue an overdrive of L3 and then return to L1 and calculate the area underneath it.

Or you could -- if you returned to the level zero, then you would calculate an area there, and you'd need to drive to a different overdrive level. So I've overlaid results that Dr. Silzars had.

And you can see there's a difference in area either way you do it. So, in

my opinion, there's three different methods here. Three different set-up conditions and three different results.

Q. Now, with respect to Dr. Silzars' testing with the overdrive disabled, did you have similar issues to his testing?

A. Well, not quite as bad, but the same errors. If you talk about the ideal quantity of light, of course, going from 50 to 225, the actual light the eye sees is in frame one here, which is at a level 225.

His measurements comes up with, I guess, two or 175.

Q. Okay. And similarly with respect to the time integration quantity of light?

A. So if you look at the time -- time integration quantity of the actual response in Dr. Silzars' measurements, you can see here, once again, this is without overdrive; therefore, the level one is applied after to the display.

And that's what the light outputs. So -- so to -- you get this area, but again it's missing the glare below that the eye sees. So

the eye would actually see what I've outlined here on the right with the cross-hatch area. It would be in addition to that area.

Q. So that would result in a different time integration, quantity of light that he included?

A. Absolutely. Both numbers would be different.

Q. Now, the examples you have gone through were going from a level of 50 to 225 back to a low level again. Did you also have some opinions regarding Dr. Silzars' testing methodology and calculations with respect to starting at a high level and going to a low level?

A. Yes, I did.

Q. What are those opinions?

A. I could show you that on the next -- next picture.

Okay. So, first of all, this -- the level is going from 200 to 75. So level three is 200 going down to level 75.

So the ideal quantity of light Dr. Silzars calculated in the area shaded in

blue on the left. However, during that -- remember the ideal quantity is looking at an ideal response.

So during frame one, the brightness level is at 75. So if you calculate the area here, that's 75. So the eye actually sees 75 during frame one.

So here, again, the very basis for the measurements are incorrect that this is what the ideal quantity of light should be.

Q. Well, using Dr. Silzars' testing methodology, would the ideal quantity of light for a signal going from zero to 250 back to zero be the same as the ideal quantity of light going from 250 down to zero back to 250?

A. Well, that shows that this is purely nonsensical. It's measuring an area up here that's not light.

Because you would get the same result if you were going -- I'm not sure the numbers that you said, but if you started it at 100 and went to 50, you would get a 50. If you started at 50 and went to zero, you'd get a 50.

And, obviously, that light is

different to the eye. And so this makes no sense to me to use this. It's purely what the eye would see during frame one.

Q. How about with respect to the time integration quantity that Dr. Silzars calculated when going from a high level to -- to a low level?

A. Well, unfortunately, that was upside down as well in his test report, I am afraid. Shown here, he measured the area that was above the curve whereas clearly the time integration quantity, as I show on the right, is the instantaneous brightness integrated over time.

So how do you measure that brightness? You measure the instantaneous. You make a curve and then you sum that up, which is shown here, the area under the curve. This is what is actually seen by the eye during that time frame.

Q. Okay.

A. So, once again, the basis of the measurements are wrong, and the ratio doesn't make sense, in my opinion.

Q. Well, you mentioned with respect to the overdrive enabled that it didn't go back to the same level?

A. Right.

Q. Was the same issue -- did it occur with respect to the high level to low level during Dr. Silzars' testing?

A. The same problem occurs, if you push the next button. The level after correction, the proper level was applied to the input or the intended level L3.

But what happens, when it went to the look-up table, it's onto the next frame, frame two and overdrive automatically puts in a different level. I don't know what that is, but you can tell on the measurement results that the brightness went to a higher level for the next frame.

So the result, as I've shown on the right, if you had gone to the same level, then this curve would have been a little bit lower. And you'd have a little bit -- I'm not sure if it would be less or more area under the curve. Any way, it would be different.

So the fundamental problem here, too, is that according to the definition of the '160 patent, it's neither going to the previous level nor to -- I don't know what is -- what it's going to. It's just going to a different level. That doesn't make any sense.

Q. With respect to the overdrive disabled, did you have any opinions with respect to the methodology Dr. Silzars applied to his calculation?

A. Well, okay. I think you see the pattern now if you look at the situation when it's disabled.

Once again, the light measured was above the curve, whereas the actual light, the ideal quantity of light is what -- actually seen by the eye is down here, which is -- should be level 75. And the same exact problem with measurements of the actual, only there was no overdrive level to go to.

So, but once again the measurements were made incorrectly, at least the calculations were made incorrectly.

Q. Well, let's go back to the '160

patent itself. You indicated that it was your opinion that substantially equal was indefinite. Why is substantially equal indefinite?

A. Well, the '160 patent doesn't really -- for instance, it doesn't give a number. So I don't -- substantially equal, let's look at the language in the claim. Substantially equal level refers to a level, which is not completely the same, but can be accepted as a substantially equivalent level.

And then it goes on to say and includes a level, which is closer to an ideal quantity of light than no preventive measures are taken.

The second part of that is clear that it's got to make an improvement upon no overdrive. But the first part substantially equivalent level can be accepted as substantially equal level, can be accepted as a substantially equivalent level.

First, can be accepted, that's subjective, unless you give some criteria for that. Substantially equivalent, it's like a circular argument to -- using the same words

or -- to define the words. It's -- it doesn't make sense.

And then the last part of the claim of the -- is closer to -- is required, but that often resulted with prior art overdrive. And certainly it does today with prior art as the rise tends to get faster. The whole purpose of overdrive is to over drive.

So you're going to get instances where the brightness is higher or the time integration quantity is higher during that frame, and some instances where -- when it's lower.

So, and this way reading the whole description, it's certainly indefinite.

Q. Well, now, do you understand that AUO has proposed that the construction be only part of that sentence, and they've omitted and included a level which is closer to an ideal quantity of light than no preventive measures are taken?

A. Yes, in reading claim constructions, I noticed that. And that they're clearly -- that clearly ignores the text in the

patent.

So...

Q. Do you have an opinion as to whether that's an appropriate -- it's appropriate to ignore that text?

A. Well, it's certainly not appropriate to ignore it when you're considering the patent for invalidity or infringement. I don't know the legal process or terminology for what the claim terms are. I know I've been told that, but I am afraid I just don't have a good understanding of that.

In my understanding, that's not an appropriate claim term, because it ignores part of the description in the patent.

Q. Well, if you add that language, does it change the meaning?

A. Well, yes, it does. And that would certainly have to be added to the AUO claim construction, whether it's in the term or whether you just include it when you do the analysis.

Q. Well, what does or does the '160 patent provide any examples of substantially

equal?

A. Well, I'm not sure it provides examples of substantially equal, but it provides examples of acceptable. You can see on Figure 3 in the patent, and then there's a waveform corresponding, as you can see on the right. It describes, for instance, Model A.

It measured some liquid crystal displays and showed the data for it. You can see Model A is mentioned, and then the light quantity ratio, which is in Column 64 is 1.02, which means there's only a two-percent variation between the ideal quantity of light and the time integration quantity measured as the '160 defines it from off to on to off.

And here they put a symbol zero, which in the text says the symbol zero indicates that almost no flicker is visually perceived. Once again, this is talking about the wire frame CAD model where you move an object through the field, which is visually full bright color on black.

So they're saying that although you can observe flicker with two-percent match,

it's almost no flicker. So I think this means it's pretty good.

So in one sense, maybe that's what they meant by ideal quantity. I'm not sure.

But that -- that's an indication that that's maybe what they meant.

Q. All right. Substantially equal or ideal quantity?

A. I'm sorry. Substantially equal to an ideal quantity.

You can further see here that there's more data on -- for instance, Model B has a light quantity ratio of 81 percent, which is 19 percent lower than the ideal quantity.

And in here, they say it's an "X", 'X' indicates that intensive flicker is perceived. So, obviously, that is not acceptable per the authors of the '160 patent.

Q. In fact, the title of the patent is directed to solving flicker; isn't that right?

A. That's correct. And as I mentioned, I'm sure it was written because of the CAD displays. They wanted to improve the

wire frame displays.

Q. Well, we've seen different numbers about what's perceptible and what's not perceptible. Have you created a demonstrative that would help explain to how you can determine what is visible to the human eye?

A. Well, first, if I could explain over here. I've made kind of a summary about what's acceptable. But notice that even though 5A is acceptable per the per this table, in the '160 patent, it says -- it indicates almost no flicker is visually perceived.

As a video display, this would be horrendous and would not be acceptable. It would have smearing. We call motion smearing.

No way would this be accepted as a video display. And, also, in the LG adjustment process, they wouldn't accept this, either. They would try to make the rise times go as fast as they could before accepting this, if they accepted it.

Q. So were you explaining that the reason it's not acceptable is because of rise time or for some other reason?

A. Yes. The reason it's not acceptable, because the rise time is too long. The frame time is 16 milliseconds. But the rise time is 18 and a half milliseconds. And the fall time is 10 milliseconds.

It's just too slow.

Q. Okay. Back to the issue of being able to perceive images.

Did you create a demonstrative to try to show what is perceptible to a human eye?

A. Yes, I did. And, believe it or not, this is what a display engineer gets a real kick out of or has fun with.

So I came up with these diagrams. The one on the left is Dr. Silzars' map with the golf ball flying through the air. And interestingly enough, we actually did this at Sony.

We took some high definition footage with slow-motion footage from sports, both golf balls flying in the air as well as a baseball. And we took measurements or we simulated different overdrives on displays, and then evaluated them visually.

Because that's really what it comes down to. You can do all the measurements in the world, but what does a TV look like is how you judge it and decide if you can sell it, and how good the video performance is.

So now Dr. Silzars -- this is his curve from also on the left. And he put an 80 percent under the first area here up to frame one.

That is not precisely what the '160 patent describes. As we've seen, the patent describes the rise time and then the area under curve for the fall time.

So the 80 percent, if it were applied according to the '160, that might be a total of 95 percent or something. I'm not sure.

But at any rate, we did do the test like was illustrated here where the first frame was some percentage. And what we found is when the golf ball moved -- first of all, Dr. Silzars' mentioned it does get fuzzy.

And the reason it gets fuzzy is because the front, for instance, would be gray. But if you overdrive it too much, then the front

will be white.

And so we found actually it was very sensitive to the one -- to the higher, the whiter. People would notice the front of. It was too wide when it was above 110 percent.

In fact, I remember a particular case where we had a 113 percent, and one of the executives came in and said, "That's a problem." He didn't like it. We lowered it to 110, and he was okay with it.

Q. Another problem that occurs on the trailing edge of the golf ball, especially as it goes through the sky, that's even a worst problem, because it's brightness over the darker sky.

So in this case, we found we had to be within ten percent. Another thing that we did was we used a roulette wheel. We used the Wheel of Fortune from the TV show and we used a car wheel with spokes and slowing down.

And so what we'd look for here is to the numbers, do they turn gray and then they get white. Again, when it stops in particular, the roulette wheel helps because we can see the

lines disappear and then come back as it slows down.

So our goal was to have the numbers be crisp and be able to -- to see the lines and the wheels, particular spokes in a car.

Q. In fact, it looks like you can see those spokes graying out here, can't you?

A. Right. That's a natural effect. They blur and then come back.

And so this occurs. There's various frequencies in here. Sometimes it's one frame. Sometimes it's two, three, or four.

But, in general, we found we had to even improve the brightness of the first frame to within five percent to make these numbers look crisp and not so blurry.

Finally, we built both CAD displays as well as often HD TVs were used for CAD systems. And so we looked at the wire frame model and as you look at -- we had a car drawn here. As the car moves horizontally, the horizontal lines are okay, but the vertical lines get dim.

And as mentioned in the '160 patent, they found when it was within two percent, it was acceptable. We found a very similar number here.

So we actually found, depending on the application and what video you see, the range of acceptable brightness in the frame could vary less than ten percent or even down to two percent.

Q. Now, the '160 patent, does it describe any of these applications specifically?

A. Well, it does mention the CAD models. It's this one.

That's the Table 3 that shows two percent was acceptable. Table 3 is not exactly what the situation would be nowadays, because rise times are much faster. But yet, the results that we had was done in the early 2000s, so maybe similar results.

Also, I might mention that we found in the sky, especially that we needed to use an eight bit of color, 256 levels, when it was reduced, of course, to 6 bit. The difference was 1.6 percent between pixels, and

everybody can see the contouring lines.

Seven bit was getting to be acceptable, but it was generally used eight bits, which is like .4 percent difference between levels, which is not visible.

I think Dr. Silzars mentioned that just noticeable differences of two percent or maybe less than that depending on the set-up conditions. That's about right.

Q. With respect to moving video images, is there a problem with trying to calculate the time integration quantity of light from moving images that use, for example, a feed-forward technique?

A. Well, yes. With the -- there's always a problem.

So you make an assumption as an engineer what you're going to do. The '160 patent doesn't really clearly tell what to do.

Once again, it was clearly written for CAD models. And when you apply it to video, it's somewhat ambiguous or indefinite. I did make a --

Q. A demonstrative?

A. -- demonstrative that you can show. So in a feed-forward overdrive what it does is you have a level that you're driving to, a level two here. Then instead of going back to the original level or to zero on video, you're going to have another step come next. Let's say, I guess, it's level four.

So what happens when you go from this level to the level four, the actual response that I've shown here is at some different location. If it's really slow, it will be lower. If it's fast, it will be higher.

So in this case, the rise time is less than the frame time of 16 milliseconds. More like current technology.

So as I've blown up here, if you take a look just at this corner right there, here's where the actual response is. It's at level three.

Now, you've got to calculate what level of overdrive we're going to use for the next frame. So if you put in the overdrive calculated based on the level two, which is what the input is, which is what's fed to the look-up

table.

So that's what's actually done with a feed-forward overdrive scheme. If you push the button, you can see that the ideal level would go from here to there or intended level.

However, the instantaneous brightness of the liquid crystal is at level three. That's because the liquid crystal capacity cannot change instantaneously.

And like it or not, that's the brightness that's coming out at that instant. So if you apply that amount of overdrive, it's actually going to go lower than level four. And you can see that there's more errors here.

So these errors are going to add up as you go. If you went down, it would be different. It would still be an error.

So it's problematic applying feed-forward overdrive to video displays. And so you make some -- if you do have that situation, you make some decisions to minimize the amount of overdrive.

And really the only way to do that

is to look at the displays, which is commonly done and has been done for all displays, and prior art as well. It's always going -- going to be a visual check to see that you haven't caused some strange problems like this, which often occur.

And this can cause even problems with different colors if your shading, because the sensitivity is different of different colors. You could get strange hues occurring. What's supposed to be gray, it might get greenish or reddish.

Q. The color changes?

A. You would get color changes due to overdrive. So you've got to look at all that and sometimes just turn it down. You can't do as much as you want, because you cause other problems.

Q. Well, now, I'll get to that later. Excuse me.

Let me first go on to the next issue. In addition to the problems with understanding the meaning of time integration quantity and substantially equal, you mentioned

earlier that there were some elements that were missing from LG Display's accused products.

And so, therefore, they don't infringe. And I believe you went through and said the storage for storing and a determinator. Can we go through, first, the storage for storing a previous brightness level and perhaps you can explain to us how you came to the conclusion that LG Display's accused products don't meet this limitation?

A. Well, I think, first, we need to go to the claim constructions. I don't think the storage is an issue, but the brightness level evidently is, where in the claim term it says brightness level. LG calls it a gray scale value or luminance value, or it could be a brightness value.

Right. Brightness level, I think, is maybe a better word.

AUO has level of intensity of light. Intensity of light is something the eye perceives that's an output from a display. True, the gray scale value results in a level of intensity of light, but I think this is a

misunderstanding in what the patent is talking about.

It's talking about a brightness level from a storage. It's a digital or it's a voltage.

Q. Well, it's also speaking about the brightness level. In fact, we'll look back at the claim.

A brightness level of the video input signal is the video input signal related to the light emitted, or is it actually the light emitted?

A. It's related to the light emitted. It's a hydrodynamic through all the process of the display, and then the drivers to the liquid crystal as well. And then it will result in an intensity level output.

So that's how I read the AUO construction. It's talking about the light out. So I think it was a misunderstanding here.

Q. Okay. Now, with respect to a storage for storing the previous brightness level of a video input signal through said logic.

A. I think it's pretty clear what the storage is for storing the previous signal. Once again, the AUO language has light intensity. That would need to be changed in order for their definition to be valid.

Q. You don't actually store a level of light in memory; is that right?

A. No. You store a voltage value or what we call a gray scale value digitally.

Q. Well, now how does LG Display the timing controllers store compressed data?

A. Well, I prepared an explanation of how it works on this demonstrative. First of

Opinion with respect to that assertion.

A. I didn't understand him to say that, but I can address that. This, of course, could occur in displays.

Q. Before we go there, what did you understand -- you were in the courtroom, what did you understand Dr. Silzars to say?

A. I believed him to say that this recovered data if it was displayed it would look terrible, it's nothing like the original, which is true. And the reason is it's only overdrive calculation data, it's not the actual data, that's what I believe he said.

But I can address your question. Yes, this would certainly would occur, for instance, you go to analog signal conversion, there is going to be all kinds of noise or black and white. There is also in certain kinds of animation they use on off pixels or shading to create shades rather than just a plain area.

There is also things that happen in the video scenes, explosions and things and when you did MPEG processing and unprocessed the MPEG --

Q. Encoding?

A. When you encode an MPEG and then decode, it's going to have some artifacts, so certainly these kind of things occur. I think this is not unusual video.

Q. Are there also types of images that could perhaps be displayed that may have that type of -- those numbers?

A. Well, as I mentioned, like computer generated video, or animations would use that. There is all kinds of things I can think of. If you take a close look at the TV, that's got that kind of data or noise, it might be noise like I mentioned with an analog signal.

Q. What about an explosion or picture of an explosion on a television?

A. Yeah, those things happen and you get a lot of crazy artifact, mostly because the satellite and cable companies don't broadcast in -- they do a lot of compression themselves with

MPEG and there can be some really strange artifacts because they're trying to save bandwidth to get more channels and save money so they didn't put the perfect image up like you may get with your Blue Ray player.

Q. In combination with not having storage, I believe you indicated that LG products don't have a determinator?

A. In the sense of the '160 patent they don't have a determinator. Let's look at the claim construction. LG mentions as it does in the patent that the determinator, you can apply the next brightness level and it has to be predetermined based on the difference in quantity of the light based on the actual and ideal response, so that's the way you calculate the next overdrive level.

Q. I apologize, I interrupted.

A. AUO simply says a logic such as circuity for determining an output brightness level, that's true as far as it goes, but the patent describes how you get that and that's not the full definition of determinator. So once again, legal language, I don't know if you have

to include the whole description in the claim term, but you certainly have to look at the whole description when you apply it.

Q. Well, with respect to the '160 patent, what does it require with respect to a determinator?

A. Well, I can explain, the patent requires logic to determine the output brightness level, and you predetermine it based on the difference as we've talked about before in the quantity of light between the actual and ideal, simply.

So it's the actual which is the square as we saw in previous measurements versus -- I mean, the actual is the waveform and the ideal is the square amount, so you predetermine by measuring the difference then you can calculate an overdrive level that would cause the actual to be closer to the ideal.

Q. Do you have an understanding of how LG Display performs its overdrive function?

A. Yes. After reading the TCON

Maximum responses --

A. I didn't hear the whole question.

Q. Do you know whether or not LG Display's customers define the necessary response time for a display?

A. Well, it's -- whether the customers require it or specify it, if it's a consumer in the store, no, he doesn't specify it. If you're selling it OEM equipment, then yes, they would specify it.

Q. Someone like Dell or HP?

A. Absolutely. But there is an art to that. It depends on the response of the liquid crystal and how much overdrive you're using. But as I mentioned there is a whole bunch of different measurements so they kind of summarize that into a number, which is a general number.

Q. Well, you mentioned earlier about the overdriving and the color change with

respect to the feed forward. And I believe Dr. Silzars mentioned something about a final visual check during his testimony yesterday. Did you hear that?

A. Yes, I did.

Q. And I believe he said that to imply the LG Display was somehow adjusting the brightness level. Do you have an opinion as to whether or not that is correct?

A. I have no idea of the intent of why he said that, but I did hear it. As I think I mentioned before, every display before you make a judgment on it, you look at it. That's obviously part of the prior art, and existing art and future art. You look at the display for a number of reasons. You look to see that the gamma curve is right. You look to see that there is no noise, or you look to see that you haven't created artifacts due to things like overdrive or MPEG encoding or decoding. You look for all those things. You look to see if the colors have changed because of your overdrive.

And quite often there will be

excessive overdrive and you got to tone it down in order to eliminate some of these artifacts. There is a whole bunch of reasons why you would look, but isn't it obvious that you would look at a display before deciding it's ready for sale.

Q. Could some of those artifacts be, for example, a color shift?

A. That's what I mentioned. If you got some different colors and you're getting more overdrive on one than another, you're going to have to turn down the overdrive. That could be done while you look at it, say there is a problem, go turn it down until the color is right.

Q. Now, you mentioned that LG Display calculates the response time. Did you look at any documents from LG Display that helped you to

A. That's right, which would affect the light on the output. And Dr. Silzars mentioned there was some ripple which I imagine was the inverter, but there was also level changes that were going on, that would make it very difficult to make measurements. I can see it would be difficult. But that's not what the eyes see when they look at the display.

Q. Now, with respect to Dr. Silzars' test results, did you have any opinions?

A. Well, yes. First of all, as I think you brought out before is that six out of the 13 TCONs were not even measured with overdrive disabled, so we have no way of comparing the numbers.

But as I mentioned before, because of the wrong instrument measuring, the photometric data was not measured so the numbers I don't believe are correct. The ideal quantity in some cases were calculated, were calculated incorrectly. And in almost all cases the time integration quantity was calculated incorrectly.

There was overdrive on frame two which was incorrect in the gray to gray transitions. Backlight was disabled and I didn't see any experimental errors so I have no idea what the errors add up to, so I don't know if I can compare two numbers, what the tolerances are on those numbers.

So based on that, I really conclude that the data is inaccurate. If I received a report like this in a company, I would reject it, of course. And you couldn't draw conclusions from it. It's not valid data.

It needs to be -- it should be redone with the corrections in order to get any kind of valid data.

MR. GOODWYN: Your Honor, I'm getting ready to move on to another topic. Is it a good time for a break?

THE COURT: We'll take a fifteen-minute recess.

(A brief recess was taken.)

THE COURT: All right. Be seated, please.

BY MR. GOODWYN:

Q. Mr. Eccles, before the break we were discussing your noninfringement opinions with respect to LG Display's accused products. In addition, did you form any opinions with regard to invalidity of the '160 patent?

A. Yes, I did.

Q. What is your opinion?

A. Well, I analyzed several patents that were prior art and I determined that in my opinion the '160 patent, at least the claims, the 1 and 3 that are addressed here are invalid.

Q. Did you look at one of the

references that was specifically identified in the '160 patent, the Mori reference?

A. The Mori is -- actually the title here is wrong. Next page, it's the '532 patent.

Do you want to go through each one?

Q. Yes.

Can you show where each of the limitations in Claim 1 are disclosed in the Mori preference?

A. First of all, a liquid crystal display comprising is shown in Mori and here in the reference here, it says a liquid crystal panel drive device.

Q. That's referencing a paragraph in Mori?

A. Yes, paragraph one.

Q. What about the next limitation?

A. So an input logic is referenced in paragraph ten in Mori, and shown in the figure on Figure 1.

Q. And a storage for storing?

A. And the storage is also mentioned in paragraph ten and shown on the Figure 11 --

well, the block 11 on Figure 1.

Q. Where it says capable of storing one frame of image data, what does that mean?

A. That means it's a frame buffer or it stores one entire frame of video drive memory for all three colors.

Q. And what about a determinator?

A. So the determinator in this case it mentions the ROM, the blocks, the ROM, the comparator and the add or subtracter which look like 12, 13 and 14 in Figure 1 of Mori.

Q. Now, you mentioned that it was difficult to understand whether or not how the determinator worked; is that right, or did I misunderstand -- let me withdraw. I think I'm misthinking of another question. Excuse me, Mr. Eccles. It shows you're paying attention.

So as to make a time integration quantity of a brightness change?

A. Well, Mori addresses that in a sense and he talks about the optimal increase/decrease values that have been stored in advance. So it is addressed here. If you go to the next --

Q. You mentioned that time integration quantity of a brightness change substantially equal to an ideal quantity of light as being indefinite; is that right?

A. That's right.

Q. Is that shown in Mori?

A. Well, it's addressed in Mori, and it calls the optimal increase, so what is the optimal increase. And here he's talking about rise time which results in an output, so you know, to tell the truth if I'm analyzing this patent, I would say that's indefinite, it is it's optimal. What is optimal? I can't put a number on it. Clearly the intent was to improve on the previous arts and these kind of words would be very well used in an SID symposium when you're presenting papers and I have seen many papers in IEEE as well.

As far as patent language, I'll leave that to lawyers to define the term. I don't know what optimal means. It means as good as you can get to me.

Q. As good as you can get, would that be substantially equal to the ideal quantity of

light?

A. I guess if we're just -- not having well defined those terms, yes, it's the same thing in my mind.

Q. What about the driver for driving an image?

A. The driver, of course, is the output that drives the liquid crystal selling extension. It says end of segment driver circuit, six, that drives the liquid crystal panel, 208, perform the display based on the output of this adder-subtracter 14. So its's described there in Figure 1.

Q. Does Mori also disclose the limitations of Claim 3?

A. Yes. First, you have to go look at frame two. I mean, Claim 2, because Claim 3 is dependent on Claim 2, which, of course, is dependent on Claim 1.

So we can see the reference to Figure 3 in the Mori patent, which describes the look-up table.

Q. That's the look-up table of Claim 2?

A. That's correct.

Q. And what about Claim 3?

A. Well, in Claim 3p --

Q. Let me go back so you can see it. There you go.

A. There. Basically all it says is a plurality of colors in a table. And so this, I believe, is also part of the table. This is part of the table.

If you go to the next one. Although it seemed obvious in Mori, that he is dealing with color, because he's driving displays, it doesn't mention it precisely. So I selected other patents that mention -- Kido does.

For instance, an Okumura, who is a very famous inventor of some of the overdrive technologies, there's certain patents that are mentioned on blue colors specifically.

Q. So let's look then at the Kido reference you just mentioned.

A. Okay.

Q. Is it your opinion that the Kido '860 reference invalidates the claims of the

'160 patent, the asserted claims?

A. Yes, it teaches all the limitations certainly of Claims 1 and 3. For instance, it provides for a liquid crystal display. So an afterimage elimination circuit for a liquid crystal display apparatus as mentioned here.

Kido mentioned -- I'm not sure what paragraph that is of the patent.

Q. How about an input logic?

A. Number 1 in the figure -- of Figure 4 as denoted in the text is the input logic.

Q. That's --

A. Text is Column 6, Lines 34 to -- 37 to 40. Excuse me.

Q. And a storage for storing?

A. Storage is mentioned in Column 6, Lines 37 to 40 and also Figure 4.

Q. And that's identified in the figure as memory?

A. Number three, memory.

Q. How about determinator?

A. Determinator is mentioned in the

text Column 7, Line 6 through 16. And it's shown in Figure 4, as you can see here.

Q. And those are elements four?

A. Subtractor of the coefficient circuit matter to do the determination.

Q. And what about making a time integration quantity of a brightness change substantially equal to an ideal quantity of light in a stationary state?

A. This is interesting, because Kido shows an outward form that's a square wave. It appears to be the ideal response. And, of course, the goal of overdrive is to achieve the ideal response, which is a voltage, which is output response from the liquid crystal. The brightness outputs being a square-wave-type response.

So the prior art, the current art, future art, the goal is to mimic that actual response time. And there are -- some liquid crystals over time got faster and faster. They start at maybe a hundred milliseconds, were up around 30 at the time '160 wasn't.

Now, we hear numbers eight, four

even 2.5 are advertised for televisions. There's a ^ fair oh, electric liquid crystal that I've used in head mounted displays which is much faster than that. So essentially with a tiny bit of overdrive, it achieves the ideal quantity of light just because you've improved the response.

So, here, I think any technique that is trying to mimic the ideal response is eventually going to get to the ideal quantity of light, because the ideal response leads to the ideal quantity of light.

So my -- in my opinion, that this also teaches that same limitation of the '160.

Q. Okay. And then we see further described in Column 5, Lines 41 to 44 the compensation.

Why is it important to know what the compensation is for signals going in the opposite direction?

A. Well, as in the context of the '160, it talks about the rise and fall, and you measure the time integration quantity under the falling curve.

So, obviously, this -- all signals have a fall eventually. So what goes up must come down.

So, in this case, he's talking about the falling time as well.

Q. So if you were able to achieve as close as possible to the ideal response time, would you achieve as close as possible to the ideal quantity of light?

A. That would be a natural by-product and that's the goal of what overdrive display designers are doing.

Q. How about the driver?

A. Well, the driver is mentioned that in Column 7, Lines 4 to 24 and in Figure 4.

Q. And is it item Number 8?

A. Yes, it is.

Q. Well, in addition to Kido showing all the elements or all the limitations of Claim 1, did you also compare it to claims -- to asserted Claim 3?

A. Yes, I did. To 2 -- and -- well, I had to look at Claim 2 as well.

Q. Right.

A. And in Figure 4 of Kido, it mentions in Column 9, Lines 27 through 32. It mentions about the --

Q. The read-only memory?

A. The ROM is the read-only memory which --

Q. What about the number of plurality of input columns?

A. Well, obviously in Figure 9, we've got red, green and blue, and it mentions in the text Column 6, Lines 51 through 54.

Q. Now, there's another reference, Johnson. Did you review or form an opinion with respect to whether the Johnson '254 patent discloses all of the elements shown in the asserted claims of the '160 patent?

A. Yes, I did.

Q. Okay. Can you step us through that, please?

A. Okay. Johnson, the liquid crystal device is described in -- liquid crystal device based on plane switching in which the switching speed is, and so forth. So, obviously it's talking about liquid crystal.

Also mentions the --

Q. I'm sorry.

A. Also mentions it hydrodynamical test of the liquid crystal. It shows they're driving some response time.

Then the input logic is mentioned in Column 3, Lines 15 and 16 and also shown in Figure 7.

Q. Storage for storing?

A. Storage, you can see. Obviously, here's the drum figure. It looks like Figure 32. I mean, Item 32. And Figure 7, it's mentioned.

In the patent, Column 4, 67 through 5, Line 2. And field store is mentioned in Column 4, Lines 66 and 67.

Q. How do you know a field delay is a storage?

A. Well, it's obvious from the circuit designer, that's what you're doing. It's, also -- as I mentioned, there's a drum up here, which is the common symbol for a memory, digital memory device.

And that's how -- in reading the

patent, that's the operation of it, obviously. In fact, we've seen this picture before. It's got the input coming, video.

It's got frame store or a delay. It could be called a frame delay or a storage. And then they both go to look-up tables to create new values.

Q. What about the limitation relating to a determinator?

A. The determinator is described in Table 1, and it mentions it in Column 4, Line 65 through Column 5, Line 14. And you can see in the table that there's replacement values.

Q. Are those replacement values or are those output values?

A. Well, okay. You're right. These are output values that are -- in terms of voltages, normally the digital memory has digital values or bits.

And so it's described here for, I guess, purposes of illustration that they're voltages. They correspond to voltages that are going to drive the liquid crystal.

Q. What about the next element, so as

to make a time integration quantity of a brightness change substantially equal to an ideal quantity of light?

A. Well, Johnson addresses this. You can see in Figure 5.

And he discusses it in Column 6, Line 61 through 65. Talks about a rise time.

And as you can see, as you improve the rise time, it gets closer to the ideal quantity of light. So, certainly, we talked about the claim limitation that requires that it be closer to the ideal quantity than if no preventive measures were taken.

So this, obviously, does that. And because it's an overdrive, it will, of course, overdrive. In this case, he's got really slow response time liquid crystal, but it's -- through the years, as the response time improves, then the rise time will go actually above.

And he basically teaches once you go above, slow it down and get equal, that's because he was talking about such slow response times. But as you get to a faster response

time, you can overdrive during the frame and then come down.

So I believe it's obvious, in some instances, applying the Johnson overdrive scheme to liquid crystals that have a faster response time than what he's showing here, you will get some instances where it does achieve the ideal quantity of light or even higher.

He also refers to the falling time which is in Column 4, Lines 29 through 32.

Q. Okay. So that the rise time and the fall time would allow you to determine the quantity of light?

A. That's right. He teaches that.

Q. And what about the last limitation driver?

A. Well, then the data that goes out to the drive is taught in Column 5, Lines 10 through 12, as well as it's shown in Figure 7.

Q. Okay. Did you also look at Claim 3?

A. Yes, I did. By first looking at Claim 2, and so there's a -- Claim 2 mentions a table for storing, and obviously, I already

mentioned Table 1 is representative of storing. And it mentions in Column 4, Lines 46 through 54 of the table.

And it also mentions while taking into, for example, the hydrodynamical properties of liquid crystal material into account.

Q. What does that mean?

A. Well, that's adjusting for the slow response time of the liquid crystal. And it's obvious that it's also different for different cells, and materials, and colors and things. But any way, he's making a general statement here, I believe.

Q. Okay. What about Claim 3 for Johnson?

A. Well, I think it's obvious, he was driving color displays. That -- I didn't see it mentioned specifically.

MR. SHULMAN: That says Kido. That doesn't say Johnson.

MR. GOODWYN: I understand.

THE WITNESS: That's correct. As I was saying, I didn't find specific mention to color in Johnson, although it's obvious that he

was driving. So I think to be technically correct, I'd refer to a different patent to teach that portion of it.

And so Claim 2 -- obviously, I mentioned Kido mentions the -- mentions the table for storing, mentions the colors, the red, green and blue. And it mentions it in Column 6, Lines 51 through 54.

Q. Is there another reference that you considered that shows the same limitations of three colors?

A. Yes. In the Okumura patent '257, it also obviously identifies in Figure 4 the red, green and blue, and identifies it in text, pixel signal by -- talks about the data basis of conversion characteristics, which may vary with the data delayed by the field memory.

Well, actually -- well, it shows it in Figure 4.

Q. But the text then refers to the compensating circuit shown in Figure 4?

A. That's right. For converting the transmittance data, which understood from Figure 4 that it's different colors.

Q. So in summary, Mr. Eccles, what is your opinion regarding infringement of LGD's -- LG Display's accused products with respect to Claim 1 and 3 of the '160 patent?

A. Well, I think I have explained my analysis of the claim. That is, LG does not infringe upon the Claims 1, 2 or 3.

Q. What about validity?

A. Well, actually in reading the prior art, I believe that the '160 certainly in Claims 1, 2 and 3 should not be valid.

Q. Now, in forming your opinions and that you've discussed, I want to show you a list of materials that were included in the binder and that we have gone over today.

The patent, and the prosecution history, and the joint claim construction statement, and a number of exhibits to your report, as well as to Dr. Silzars' report. Did you rely on all of these documents in forming your opinions today?

A. I relied on those and some others. Yes.

MR. GOODWYN: Okay. Your Honor, I

would like to offer into evidence LG Display Trial Exhibit Number 1083 and all the documents cited therein.

MR. SHULMAN: No objection, Your Honor.

THE COURT: Admitted.

MR. GOODWYN: Thank you.

MR. SHULMAN: Your Honor, before I begin the cross, can I just deal with one housekeeping matter?

THE COURT: Sure.

MR. SHULMAN: During my cross-examination of Dr. Rubloff, I referred to LGD 629-015, which was a slide that they used during the direct. And there's no way to know what that is in the record.

So I'd like to mark for identification as AUO Exhibit 1585. I'm not offering it into evidence, but just marking it for identification, so we know that it's that slide.

THE COURT: We can -- actually I think a good technique is to actually admit it into the record, unless you object and just give

it the designation of the number plus A.

MR. SHULMAN: I have no problem with admitting it into the record, but I didn't follow the last part of what you just said.

THE COURT: Is that the same number that was used in the reference during the course of the presentation?

MR. SHULMAN: Correct. And I've just marked it with an exhibit number, because it didn't have an exhibit number.

THE COURT: Oh, so you gave it a separate exhibit number?

MR. SHULMAN: Correct. That's what I'm doing right now.

THE COURT: Okay. That's fine.

MR. SHULMAN: Slide LG 629-015 is AUO Exhibit 1585.

Slide LGD 629-019 is exhibit AUO Exhibit 1586.

Slide LGD 629-023 is AUO Exhibit 1587.

And then there were excerpts from LGD Exhibit 380 that were part of the direct examination of Dr. Rubloff. There were two

excerpts.

The first pertained to the product known as LT060V1. And we've marked that as AUO Exhibit 1589.

And lastly, the second excerpt from LGD Exhibit 380, which pertained to the product LT071D1, we have marked as AUO 1590.

THE COURT: It's admitted.

MR. SHULMAN: Thank you.

MR. GOODWYN: Your Honor, if I could just do one housekeeping thing as well, perhaps it will clarify or simplify things. I'd like to offer into evidence the demonstratives that were used with Dr. Rubloff as LG Display Trial Exhibit 1084 and the demonstratives used with Mr. Eccles as LG Display Trial Exhibit 1058, so there's a complete set of all the demonstratives instead of just pieces.

THE COURT: It will be admitted.

MR. SHULMAN: That's fine. Your Honor, how much time do we have today, so I can gauge myself?

THE COURT: We're going until five o'clock.

MR. SHULMAN: Okay.

CROSS-EXAMINATION

BY MR. SHULMAN:

Q. Mr. Eccles, we've not met before; correct?

A. No. Hello.

Q. Hello. As you probably know, my name is Ron Shulman, and I have a few questions for you.

Now, in your opinion, what the overdrive invention of the '160 patent seeks to do is to cause the pixels and the liquid crystal display to emit a quantity of light that is equivalent to the ideal quantity of light; correct?

A. Basically, yes, under the conditions that are described in the '160.

Q. Now, let's focus on conventional overdrive systems that predate the invention of the '160. In your opinion, seeking to improve the response time of the liquid crystal material is the fundamental purpose of conventional overdrive; correct?

A. Well, seeking to improve the

response time, yes, in order to get better motion pictures on the display. So the end goal is to make a better picture, but yes, what they do is improve the response time.

Q. Okay. And the Mori prior art reference that you spoke about today is an example of a conventional overdrive system; correct?

A. Yes.

Q. And the Kido prior art patent that you relied upon is another example of such an overdrive system that attempts to improve response time; right?

A. It has some nuances in it that I wouldn't say are conventional, has some additions, but basically that's the same thing it tries to do, yes.

Q. And the Johnson prior art patent that you relied upon today is, yet another example of such an overdrive system that attempts to improve the response time; correct?

A. That's true.

Q. Okay. Now, is it true, sir, that if you use the prior art overdrive system such

as Mori, and Kido and Johnson that seek to improve the response time, you may emit, but you will not necessarily emit a quantity of light that approaches the ideal?

A. That's true, you may also emit the actual quantity of light or you may emit more. You're right, it would be -- it could occur, it's not a guarantee to occur.

Q. In fact, merely improving response time can result in an amount of light that is farther away from the ideal amount of light than would be the case if the response time were not improved; correct?

A. That's possible in the case where you're improving the rise time and the fall time is faster than the rise time, so there is particular waveforms and liquid crystal materials that if you drove it that way, you could get less time integration quantity of brightness than if you didn't do it.

Q. Indeed there is an example of that in the patent?

A. That's right.

Q. That's Figure 5B; right?

A. I believe so.
Q. Right.
Now, is it true, sir, that although the Kido reference discusses improving response time, it nowhere mentions improving the quantity of light?
A. That's correct.
Q. And is it likewise true, sir, that the other prior art references that you rely upon today nowhere mentions improving the quantity of light?
A. They do not mention that per se. As I mentioned, they attempt to match the ideal response time which would be an indirect way of achieving the ideal quantity of light, but you're right, they do not specifically mention the issue of quantity of light.
Q. It may or may not be an indirect way of improving the quantity of light as we just went over?
A. It may or may not.
Q. Let's turn to the '160 patent and let's again by looking at unasserted Claim 12 on the screen, please.

This is not asserted. But do you see that Claim 12 is a method for driving a liquid crystal? I'm not going to ask you detailed questions about this.

A. Yes.

Q. And according to unasserted Claim 12, that method comprises a series of steps that are recited there; right?

A. Right.

Q. Now, let's look at asserted Claim 1 on the screen. Do you see that in contrast, to method Claim 12, Claim 1 covers a liquid crystal display itself?

A. Yes.

Q. Okay. And according to Claim 1, the liquid crystal display itself comprises certain structures that are set forth in the claim; right?

A. Yes.

Q. And Claims 2 and 3 depend from Claim 1; right?

A. That's right.

Q. And each of Claims 2 and 3 call for additional structures that are not recited

in Claim 1 by itself; right?
A. Yes.
Q. Okay. Now, unlike method Claim 12 which calls for certain steps to be performed, asserted Claims 1 through 3 call for structures that make up the liquid crystal display; correct?
A. I'm not familiar with the term structure, but it sounds right.
Q. Structures are things you can look at and touch and feel?
A. If we're talking laymen's terms, yes.
Q. Yeah, I don't mean to confuse you with legales.
A. Okay.
Q. And do you understand, sir, that to infringe Claim 1 or Claim 3, someone has to either make, use or sell a liquid crystal display that contains these various structures that are defined in the claim?
A. Yes.
Q. Okay. And Claims 1 and 3 do not recite any steps that must be performed before

making, using or selling the liquid crystal display; correct?

A. Well, when it talks about a determinator, it puts some definition to that in that it's based on the previous brightness level and next brightness level and comparing it, so I think the process of doing that is inherent in the definition of the determinator.

Q. We're going to get to that. You would agree that whatever -- we'll get to the definition of determinator. This recites structure, Claim 1, not method steps; right?

A. I'm afraid I'm not familiar enough with the terms structure and method to comment on that.

Q. You would agree that the word "step" does not appear in Claim 1; right?

A. The word "step"?

Q. Yes.

A. I don't see it in Claim 1.

Q. And it doesn't appear in Claim 2 or 3 either; right?

A. I'll take your word for it that it doesn't.

Q. Well, if you have any doubt, you better confirm it for yourself.

A. I better.

Q. If you're willing to accept my representation, just say so.

A. No, I do not see the word step.

Q. But in your opinion, Claim 1 requires what you call a predetermination step; correct?

A. That's correct.

Q. Okay. And you'd agree with me, however, that the word predetermined or predetermination or any of its variants also does not appear in Claim 1, Claim 2 or Claim 3; right?

A. Right, I used that word.

Q. Right.

Now, in contrast to asserted Claims 1 through 3, which don't mention predetermining anything, there are other nonasserted claims in this patent that specifically require a predetermination step; correct? For example, let's look at nonasserted method Claim 9 on the screen.

A. Okay.
Q. And do you see there the very first subparagraph of that claim specifically recites a step that calls for storing certain predetermined information; right?
A. Well, this is referring to a predetermined gray scale level which is the input, and all inputs are predetermined.
Q. Okay. But it's calling for something that's storing something that's predetermined, that's the step; right?
A. It says the word predetermined, and I would say it's referring to the input.
Q. Okay. So based on what we see in nonasserted Claim 9, would you agree that the inventors of this patent knew how to include a predetermination step when they intended to do so?
A. Well, I have no idea of their intent or their ability in English language or if somebody helped them, I couldn't comment on that. I agree that they didn't put the word in Claim 1.
Q. But you want to include it in

Claim 1?

A. I don't have to include that word, but we're talking about -- if we're talking about the determinator, you're comparing the two different levels, then that work needs to be done in order to calculate the overdrive for the lookup table.

Q. It's your opinion that Claim 1 requires what you have called quote a predetermination step; right?

A. That's my opinion, yes.

Q. Okay. Now, you have expressed the opinion that LG's accused products don't infringe Claims 1 through 3 of the patent, or Claims 1 and 3, rather?

A. Yes.

Q. Because LG does not practice the predetermination step that you believe is required; right?

A. That's one of the reasons, yes.

Q. Let's call that opinion number one, just focusing on predetermination. And let me ask up a hypothetical. If the Court were to conclude that the predetermination step is not

required by Claim 1, then opinion number one of yours should be rejected; correct?

A. Well, Claim 1, LG still would not violate Claim 1.

Q. For other reasons, I'm just talking about predetermination. If the Court rejects your notion that predetermination is an element of Claim 1, then opinion number one which hinges on the absence of predetermination would have to be rejected; correct?

A. Well, if -- I think you could explain it in other terms. It clearly states what needs to be done in Claim 1 in order to come up with the overdrive values for the lookup tables, so whether you call that predetermination or not, there is something that needs to be done to achieve that, because it talks about achieving the ideal quantity of light.

Q. But what you have referred to as the predetermination step is what I'm using for purposes of my question. And if the Court rejects that what you've referred to as the predetermination step is an element of Claim 1,

then your noninfringement opinion based upon the necessity of practicing that predetermination step would disappear; correct?

A. I don't think it's that simple.

Q. Okay. Let's move on, then.

Now, is it correct that in your opinion, Claims 1 through 3 also require that something called an offset must be applied to the next brightness level?

A. Yes.

Q. And do you agree that the word offset does not appear in Claims 1 or 3 or 2?

A. (Witness reviewing document.) Claim 2 talks about modifying said brightness level.

Q. Does the word offset appear, that was the question?

A. The word offset does not appear.

Q. Okay. Now, in contrast to asserted Claims 1 through 3, which do not mention any offset, there are other nonasserted claims in this patent that specifically require the use of an offset; correct?

A. Yes.

Q. For example, let's look at independent Claim 4, which is not being asserted. And as you can see on the screen, in the third and fourth subparagraphs of Claim 4, they specifically call for an offset; right?

A. Yes.

Q. Okay. So would you agree that based on what we see in Claim 4, whoever drafted this patent knew how to include the use of an offset when they intended to do so?

A. Certainly in Claim 4 they intended to and they did.

Q. But the inventors or whoever drafted this patent chose not to include an offset in the asserted Claims 1 through 3; right?

A. It does not appear there, yes.

Q. But you want to include one?

A. I think that's one way to state it, yes.

Q. Okay. Now, let's say the judge rejects your position that an offset is required by Claims 1 through 3. You've expressed the opinion that LG's accused products don't

infringe those claims because LG doesn't use an offset; right?

A. That's one reason, yes.

Q. And so if the judge rejects your view that offset is required by Claims 1 through 3, then he would likewise have to reject your opinion that there is no infringement because of the absence of an offset?

A. In the strict sense of looking at the offset and the word offset, what you said is true. But you do have to read the claim and understand what is described here, so I'm not sure that the word is that important. If you take that word out, but as long as you apply the claim, then that would be an interpretation that would apply for the Judge to look at.

Q. Let's talk about your third and final basis for concluding that LG does not infringe the asserted claims. And again, let's look at Claim 1. And the second element of Claim 1 calls for a storage structure in which the previous brightness level is stored. Do you see that?

A. Yes.

Q. In your opinion LG's accused products don't have that element; right?

A. That's correct.

Q. And in your opinion the storage structure in the accused products stores a compressed representation of the previous brightness level rather than the data itself; right?

A. Yes.

Q. Okay. And in your opinion, the compressed representation of the brightness level data is different than the brightness level data itself; right?

A. Yes, that's obvious from looking at the data tables.

Q. For that reason you conclude that the accused products lack the storage element of Claim 1 and, therefore, do not infringe; right?

A. Yes. As you read the text in the claim, it clearly says the previous brightness levels, so I conclude that.

Q. In forming your opinions concerning how the accused products work, you relied on various documents and deposition

transcripts among other things; right?

A. Yes, I did.

Q. And one of the deposition transcripts you relied upon was the testimony by an LG engineer, Mr. Jong Kim; right?

A. Yes, I did.

Q. Do you recall that Mr. Kim was designated by LG to testify about the implementations of overdrive in accused LG products?

A. First, yes, I testified to that. And I would like to explain the meaning if I may.

Q. Well, I tell you what, you can do that on redirect.

MR. GOODWYN: Your Honor, again, counsel is continuing to interrupt the witness's answers. He tried repeatedly to say that he wanted to explain his answer and I believe to give a full response the witness should be entitled to provide a full response to question.

THE COURT: You can give an explanation.

THE WITNESS: Could I have the question back please.

Q. I asked you did you testify that in the accused products that LG sells, the small differences that may be introduced are acceptable and allowable, you said yes, and now you want to give an explanation?

A. Yes. The differences that occur first of all, the restructured or the

decompressed data is used to calculate overdrive values, and so what it's going to do is it is going to cause some errors in the overdrive as it's calculated. There could be some small errors that you would have to look closely at, there could be some larger errors that would be glaring. When you look at a display as you mentioned, I have had quite a bit of experience at evaluating TV performance, if you're selling a TV that's going to sell for $200 you would gladly accept a lot of those artifacts because the price is so low. If you're selling something for more than a thousand dollars or two-and-a-half thousand dollars, you would need to examine much more closely and eliminate those artifacts.

So are they acceptable? It depends on the product and depends on how well you can do with the technology and how much you want to save money by reducing the memory size.

Q. Okay.

A. So that's what I mean by acceptable.

Q. Very good.

Would you agree, sir, that if the compressed and decompressed data in the accused LG products were substantially different than the original data, LG wouldn't be able to sell its modules?

A. I'm not sure what you mean by substantially different. You're talking about the data that goes into the lookup table, not the output?

Q. If the compressed and then decompressed data is substantially different in the accused LG products from the original data that exists before it's compressed, if those things were substantially different, then wouldn't you agree that LG wouldn't be able to sell any of its modules?

A. Well, first of all, there is two parts to that question. What does substantially different mean? Different data is -- if it's supposed to be 24 and it's 36, is that substantially different? That's 30 percent. If it's supposed to be a hundred and it's 110, that's ten percent. I'm not sure what substantially different is.

But once again we have to remember this data is only used to calculate the overdrive values. This data is not displayed on the screen. So as I explained in the block diagram, it goes up there, it calculates overdrive values and because it's put in blocks there is an average that occurs over the display. So although the numbers can be quite different, maybe even substantially different, there will -- there could be some averaging of that over the display, so I'm not prepared -- first of all, since I don't know exactly what substantially different means in terms of numbers, I couldn't really define it, but certainly differences will occur and I could look at a display and tell you where that's occurring, and I could go to a store and tell you that because those products are sold.

Q. Okay. Whatever the differences are between the original data and the decompressed data on the other end, it's good enough for LG to sell the products?

A. Obviously, yes.

Q. Now, you believe that Kido

anticipates the '160; right?

A. Yes.

Q. And do you recall being asked at your deposition whether Kido teaches compensation such that the time integration quantity of a brightness change is effectively equal to the ideal quantity of light, do you recall being asked that question?

A. I don't recall the question. I recall the topic and about that, I don't recall exactly that question.

Q. Let's look at your deposition at 102, lines 16 to 19.

"QUESTION: It's your opinion that Kido teaches compensation such that the time integration quantity of a brightness change is effectively equal to the ideal quantity of light?"

So you were asked that question; right?

A. Yes.

Q. Let's look at the answer. Your response was, "No, I don't believe that's what I said."

And then you continue to explain what you meant; right?

A. Yes.

Q. Now, let's look at page one of Exhibit L to your expert report on validity. And this is a claim chart. Can you blow up the top there, Bill. Thanks.

This a claim chart you prepared comparing the '160 claims to the Kido reference; right?

A. Yes.

Q. And if we could focus in on the bottom two boxes on that page, you identified something called the after image elimination circuit shown in Figure 4 of Kido as corresponding to the determinator; right?

A. Yes.

Q. And as you state here this after image elimination circuit outputs a quote, compensated video signal, unquote; correct?

A. Yes, it does.

Q. So if Kido's after image circuit corresponds to the claim determinator, then am I correct in understanding that Kido's output

compensated video signal corresponds to the claimed output brightness level in your opinion?

A. Well, yes, it determines an output brightness level, it may -- yes, in those particular words, yes.

Q. And let's explore that. Kido's compensated video signal is the sum of two other signals; correct?

A. Yes.

Q. And it's the sum of something called Si, and the compensation signal Ss; correct, right down there at the bottom?

A. I can't see that.

Q. Figure 2 B at the bottom of the page.

A. I can't see it.

Q. It's very small.

Bill, go back to page two of Exhibit L down at the bottom there, blow up Figure 2B. There is Si, and --

A. Ss, yes, the compensation is added to the Si.

Q. Okay. And Figure 3 of Kido refers to the compensation signal Ss; correct?

And let me point you to where the Kido patent says that, column seven, lines 45 to 60 of Kido. See it refers to the compensation signal illustrated in Figure 3?

A. Yes.

Q. And the compensation signal Ss of Figure 3 is a voltage; correct?

A. It appears to be so because it has a fault to it.

Q. And according to your view of the world, a voltage is not a brightness level; correct?

A. No, that's not true.

Q. Let's look at your deposition. Page 108, lines 13 to 15.

"QUESTION: Is it not a brightness level then?

"ANSWER: A voltage is not a brightness level. So it refers to a voltage."

You did give that testimony; correct?

A. I need to read before and after this and I could explain fully.

Q. Well, you can do that on redirect.

Now, asserted Claim 3 of the '160 depends from Claims 1 and 2; correct?
A. I'm sorry, I didn't understand.
Q. Claim 3 depends from Claims 1 and 2; right?
A. Yes.
Q. And Claim 3 includes all of the limitations of Claims 1 and 2; right?
A. Yes.
Q. Now, let's look at Claim 2 and how you compared it to Kido. Okay?
A. Okay.
Q. Your comparison can be found at page four of Exhibit L to your expert report on validity which is now on the screen. Do you see page -- Claim 2 down there being compared to Kido on the screen, sir. It's from your expert report.
A. Okay.
Q. And Claim 2 requires that the determinator include a table for storing a brightness level; correct?
A. Yes.
Q. Now, let's look at the third box

on the right of page four of Exhibit L on the screen and there you state that the Kido reference discloses the claimed table in the form of a table of values held in a ROM that is described at column 9, lines 27 through 32 of Kido; right?

A. I'm sorry, I didn't follow that. Are you reading from the slide?

Q. Yes.

It says that the claimed table in Kido, it's disclosed in the form of a table of values held in a ROM and that's disclosed at column 9, lines -- it's the highlighted text, sir.

The table in Claim 2, what you found corresponding in Kido is a table of values held in a ROM which is described at column 9, lines 27 through 32?

A. Okay. The table is the ROM?

Q. Right. Are you with me?

A. Yes.

Q. Now, as indicated in this same box we're looking at on the screen, the ROM described at column 9, lines 27 through 32 of

Kido is an implementation of what Kido calls coefficient circuits. Do you see that?

A. Yes.

Q. Okay. And the implementation of the coefficient circuits discussed in column 9 of Kido stores values K1 and K2 in the ROM table; correct?

I can show you your deposition if you don't recall.

A. That sounds right. I believe so.

Q. But K1 and K2 are not brightness levels; correct?

A. I need to look at the --

Q. Let's look at your deposition, 110, lines 17 through 20.

"QUESTION: Now, K1 and K2 are not brightness levels; correct?

"ANSWER: No. They are coefficients, they're abstract concepts or mathematical concepts."

That was your testimony; right?

A. In the context we were talking about that, yes, that's what I did reply.

Q. Let's turn to Johnson. And let's

look at Johnson Figure 5, which is now on the screen. And you agree that the goal of Johnson's invention is to have the pixel reach the desired brightness before the next frame time; correct?

A. Well, he states that as a goal. Yes, but other things occur.

Q. Okay. Right.

But that's one of the goals?

A. That's one of the goals, yes.

Q. And that goal is what's illustrated by the dotted line with the parenthetical three that's in the middle of Johnson Figure 5; right?

A. If you're referring to that's the goal that he wanted to get to, yes.

Q. Okay.

A. In this case, 60 percent transmission.

Q. You would agree that what we see here in curve number two in Johnson, the curvy curve up at the top there, certainly would not be the ideal quantity of light during the first frame time namely between time zero and time T

sub F?

A. In this particular case with these examples of these very slow rise times, that's true. There's no way for that to get to the ideal quantity of light.

Q. Okay.

A. However, with -- as the years go by and technology improves, then -- and as the rise time gets less, than the frame time, certainly that would occur using this technique.

Q. Now, during the first frame time, namely between time zero and time T sub F, what's shown in curve number two in Johnson Figure 5 appears to be -- appears to be closer to the ideal quantity of light than curve number one where no overdrive is used; right?

A. Yes, it is.

Q. However, you would agree that merely providing something that is closer to the ideal quantity of light does not meet your definition of the claim phrase substantially equal; right?

A. Absolutely. It does not meet my definition, nor do I see how it could meet

anybody's definition of substantially equal.

Q. Okay. In your opinion, to be substantially equal to the ideal quantity of light, two conditions have to be met.

First, the actual quantity of light has to be such that it can be accepted as substantially equivalent to the ideal quantity.

And, second, the actual quantity of light should represent an improvement over what you would get without using overdrive at all; correct?

A. I can clearly understand the second part being closer. The first part is so nebulous. I believe it's indefinite.

If there was a definition of what that was; absolutely, yes. It would need to meet that.

I -- I just have trouble defining that, and so I have offered some numbers in different cases that I think would be acceptable or hardly visible. But in the actual definition of that, I leave that to somebody else to decide what it is going to be interpreted as legally.

Q. Well, let's see what you said at

your deposition. See if -- let's just see what you said at your deposition.

Page 51, Lines 5 through 16.

"Question: Is it your view then that you really need to meet both conditions? One, the quantity has to be such that it can be accepted as substantially equivalent; and, two, it should represent an improvement over what you would get without using overdrive?"

"That's correct." And then you proceeded to explain.

A. Just like I did now.

MR. GOODWYN: Objection, Your Honor. I'd like to have the record reflect the full question and the full answer.

MR. SHULMAN: I'll read it.

MR. GOODWYN: And the full answer. We have been getting partial answers in the record.

MR. SHULMAN: I'll read it in. Your answer was, "That's correct. I still have difficulty with the first statement of defining what is accepted as substantially equivalent, but that's the intent. You need to be accepted

as substantially equivalent, and it needs to be some improvement over a circuit that has no overdrive applied."

BY MR. SHULMAN:

Q. Both conditions; right?

A. That's correct.

Q. Okay. Now, you didn't mention the Hartman reference today, did you?

A. No, I did not.

Q. It was in your expert report, but we heard nothing about it today; right?

A. I didn't mention it today. No.

Q. And in your expert report, you mentioned a -- I don't know how to pronounce it U-E-N-O reference.

A. Ueno.

Q. Ueno?

A. Ueno.

Q. Ueno. Thank you.

A. It's Japanese.

Q. You didn't mention that one today either; right?

A. I didn't feel that I needed to. I think there was plenty of evidence and

descriptions in the patents that I did use.

Q. Right. Just give me a moment. I have a couple of other questions.

Do you have the set of slides? Can we have the elmo please?

MR. SHULMAN: Can I confer with counsel for a moment?

THE COURT: Sure.

(Following a discussion held off the record:)

BY MR. SHULMAN:

Q. 1085 is the LG Exhibit Number for the slides that were used during his direct examination, and I'm going to refer you to Slide 44 in that deck. Okay.

A. Okay.

Q. Do you recall this slide?

A. What slide number is that?

Q. Hang on. Hang on. This is Slide 44.

If you need me to zoom in, just let me know or you can look in your book.

A. I can look at it here. I can't quite see it on the display.

Q. Slide 40. Woah.
A. Okay.
Q. Okay?
A. Yes. I don't see it up there, but I see it here in mine.
Q. This was a comparison of Mori to Claim 1; right?
A. Yes.
Q. Okay. Either my eyes are bad or the focusing isn't working.
A. The focus is not good there, but I can see it on the page that I have.
Q. Can you tell me what the question mark, the green question mark means?
A. Yes. I believe that that particular limitation is indefinite.
Q. So you're not sure if Cori -- Mori rather has ideal in it?
A. I'm sure of the word optimal as I am sure of the word ideal. So if you're fair to both sides, then yes, I believe it teaches that.
Q. Okay.
A. Now, I asked the reporter during your direct testimony to jot down an answer that

you gave. In fact, it was the last answer on direct.

And he can't both read it and write at the same time, but she's now taking it down, so maybe we get around that problem; right?

THE REPORTER: Right.

BY MR. SHULMAN:

Q. But at the tail end of your examination --can I borrow that for a moment? And I'll have the reporter read it in, because you don't have to take my word for it.

But at the tail end of the direct examination, you were giving sort of a conclusory summary of what your opinions were with respect to the patent. Do you recall that?

A. Yes.

Q. And you spoke about infringement. You spoke about validity; right?

A. Yes.

Q. And with respect to infringement, you summarized the opinions that you had -- that you expressed today rather concerning the tests that our expert wrote; right?

A. Yes.

Q. And those tests were described in the report that he submitted, I think it was in February sometime; right?

A. I don't recall the date. I remember the report.

Q. The first round of reports?

A. That would have been February 20th.

Q. 7th?

A. Or 4th maybe.

Q. So -- and so you had the opportunity to review that report from February 27th until certainly up through the time of your deposition was taken; right?

A. Yes, I did.

Q. And your deposition was taken in April? April or May?

A. It was late April.

MS. HOLLOWAY: April 21st.

MR. SHULMAN: April 21st, I'm told.

THE WITNESS: Yes.

BY MR. SHULMAN:

Q. And at the tail end of your cross, or I'm sorry, your direct, you said, and I'll have the court reporter read it, "But if I received a report like this in a company, I would reject it, of course. And you couldn't draw a conclusion from it. It's not valid data."

You were referring to Dr. Silzars' report; correct?

A. Yes, I was.

Q. Okay. And the opinions that you expressed today concerning Dr. Silzars' -- the inadequacies of Dr. Silzars' report were not set forth in your expert report; correct?

A. In my -- no, I had no chance to -- the opinions that I ascribed today, I don't believe were set forth in my expert report. No.

Q. Right. And you had a month to prepare your expert report after receiving Dr. Silzars' report; right?

A. Yes, I did.

Q. And then at your deposition?

A. Well, I didn't have exactly a month. I got documents from McKenna, Long &

Aldridge. It wasn't exactly at the same time. It took some time.

But approximately, you know, maybe three weeks I had.

Q. Well, your responsive report was submitted a month after --

A. Right.

Q. -- his report was submitted?

A. That's right.

Q. Correct?

And then you had another month before your deposition was taken; right?

A. Yes.

Q. And at your deposition -- is the elmo still on? Yes.

Pardon my ineptitude. This is Page 73.

You were asked: "Okay." This is all about Silzars' report and his experiments.

"Okay. But sitting here today, you have no basis for saying that they are not accurate, is that fair?"

"I have no -- I've not noticed any evidence or something concrete that I would say

is incorrect in his measurements. I -- as I explained, I don't have enough information to determine if they are correct or not."

And you had his report for two months at that point; correct?

A. Approximately, yes.

MR. SHULMAN: I have no further questions.

THE COURT: All right. How long do you have?

MR. GOODWYN: I actually just have a couple of questions. I have one request that one of the first deposition transcripts they put up and only read a portion of an answer. I request that the record reflect an entire answer and then I have one quick question.

THE COURT: All right. Ask it.

MR. GOODWYN: Then we'll get that conclusion under Rule 106.

REDIRECT EXAMINATION

BY MR. GOODWYN:

Q. Mr. Eccles, you were just asked as to whether or not you had included any analysis of or opinions regarding Dr. Silzars' testing in

your report; is that right?

A. Yes, I was.

Q. Okay. And you -- I believe that the deposition transcript that counsel put on the screen during your cross was that you said you didn't have enough information; isn't that right?

A. That was part of my answer. Yes.

Q. When did you first get sufficient explanation of Dr. Silzars' testing methodology to allow you to understand what he did?

A. Approximately last week when I received his deposition transcript, and I noticed that he mentioned using silicon detector photo diode that was linear response, and that he compared it to several others that were also in linear response and that he did not do calibration.

At that point I got to thinking, What's the validity of these measurements? So with my experience with making radiometric versus photometric measurements, it was obvious to me that the actual data would not be what the eye sees, which is what the '160 calls out.

Therefore, at that point I realized that the measurements of all this data was incorrect. As I further studied and looked at the report, I admit I missed something and that was the time integration quantity of light and the ideal quantity of light.

I just -- I probably arrived at that last week after I got into the measurements. I was thinking about, Well, how would the curve be different if I applied a photometric curve?

And I go, Woah, that's not even the right thing to measure. So, at that point, I started -- that's when I made the list of what things I would have done when I was directing photometric measurements.

And I realized the set up, the calibration, all those things, elements were missing. So, yes, I should have noticed it a couple of months ago, but the trigger was the deposition testimony, that incorrect sensor was used.

MR. GOODWYN: Thank you. No more questions.

THE COURT: All right. Thank you.
You may step down. Thank you.
All right. We'll be in recess until 9:30 tomorrow morning.

THE CLERK: All rise.

MR. BONO: Your Honor, can we just handle that right now for the ten seconds, because I just -- we need them as a professional courtesy to put that segment on. We don't know what page it's from.
He didn't cite the page number. If he could just put that on the screen, we'll read it in and then be done with that one housekeeping issue.

THE COURT: Sure.

MR. BONO: If you could do that, please.

MR. SHULMAN: It was professional courtesy. I did read the pages and line numbers, but I'm happy to do it again.

MR. BONO: Thank you.

MR. SHULMAN: Do you know what the point was?

MR. BONO: It's where the answer

was no.

MR. SHULMAN: What was it?

MR. BONO: It was like the third read in right before --

MR. SHULMAN: The very first one?

MR. GOODWYN: Yes.

MR. SHULMAN: Whoops. I'm looking at the wrong outline. Pardon me.

We're not going to be able to do it now. We'll work it out and we'll do it first thing in the morning.

THE WITNESS: I could find it.

MR. SHULMAN: Pardon?

THE WITNESS: I could find it.

THE COURT: You can do it in the morning. We will make that the first order of business. You will have a chance.

MR. BONO: Just one other thing, Your Honor. It's my understanding, AUO is proposing to call a rebuttal witness, Mr. Sung, and we filed a motion this morning to preclude this testimony.

And I wanted to alert Your Honor to this. We believe the testimony should not be

permitted.

THE COURT: I didn't see the motion. I didn't know it was filed. I'll take a look at it.

MR. SHULMAN: We're going to be submitting a responsive brief today.

THE COURT: All right. So I'll get them both and get you an answer tomorrow.

All right. We will be in recess until 9:30 tomorrow morning.

MR. SHULMAN: Thank you, Your Honor.

(Court was recessed at 5:05 p.m.)

State of Delaware)
)
New Castle County)

CERTIFICATE OF REPORTER

I, Heather M. Triozzi, Registered Professional Reporter, Certified Shorthand Reporter, and Notary Public, do hereby certify that the foregoing record, Pages 667 to 1,047 inclusive, is a true and accurate transcript of my stenographic notes taken on June 4, 2009, in the above-captioned matter.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 4th day of June, 2009, at Wilmington.

____

Heather M. Triozzi, RPR, CSR
Cert. No. 184-PS